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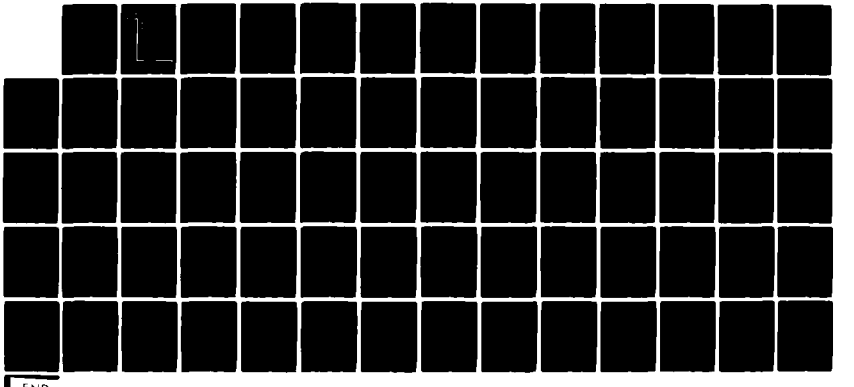

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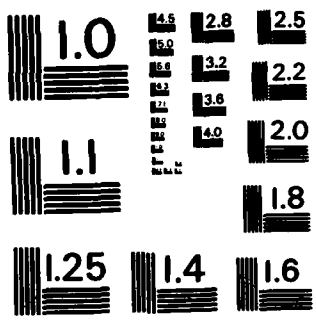

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AIR FORCE HUMAN RESOURCES LABORATORY

IAPG:

AN ITEM ANALYSIS PROGRAM FOR QUESTIONNAIRE-TYPE TEST INSTRUMENTS

By

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Brooks Air Force Base, Texas 78235

August 1980

Final Report

AIR FORCE SYSTEMS COMMAND
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This final report was submitted by Manpower and Personnel Division, under Project 6323, with HQ Air Force Human Resources Laboratory (AFSC), Brooks Air Force Base, Texas 78235. Mr. Walter G. Albert (MOM) was the Principal Investigator for the Laboratory.

This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

RAYMOND E. CHRISTAL, Technical Director
Manpower and Personnel Division

RONALD W. Terry, Colonel, USAF
Commander

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

IAPG (Item Analysis Program, General) is a versatile series of item analysis computer programs. The input consists of responses to items for which the correctness or incorrectness of a particular alternative is not the same for all respondents. The comprehensive statistical/mathematical methodology that comprises IAPG enables the user to optimize the composite validity of a test instrument subject to certain restrictions delineated in this report and perform complex item analysis procedures.

This report documents the input/output and mathematical/statistical methodology to be used in executing and interpreting the results of the IAPG group of programs. It contains the technical details that

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are necessary for the user to take complete advantage of the analytical capabilities of IAPG. This information includes computational formulas, control and data card descriptions, file layouts, printed output samples, diagnostic messages, and examples of run time.

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SUMMARY

In 1965—1966, the Service Bureau Corporation, Houston, Texas, programmed the IAPG (Item Analysis Program, General) methodology that had been defined at the 6570th Personnel Research Laboratory, Lackland Air Force Base, Texas. IAPG consists of seven item analysis computer programs that use the responses to items for which the correctness or incorrectness of a particular alternative is not the same for all respondents. IAPG has undergone many changes since its inception. This report brings the user up-to-date concerning the card and/or file input and printed and/or file output capabilities of IAPG.

The IAPG statistical/mathematical methodology is supported by the computational formulas shown in Appendix A. The description of the control and data cards, input/output file layouts, samples of the printed output and diagnostic messages are shown in Appendixes B to E, respectively. IAPG is a versatile program; however, it can be time consuming as shown in Appendix F. As the number of cases and/or items becomes large, the computer time required could become a limiting factor.

PREFACE

The research was completed under Project 6323, Personnel Data Analyses; Task 632305, Development of Analytic Methodology for Air Force Personnel Research Data. Dr. Raymond E. Christal was the individual primarily responsible for the development of the IAPG methodology and its implementation on the AFHRL IBM 7040 computer system. Dr. Robert A. Bottenberg is due special acknowledgement for conscientiously working with Dr. Christal on the project and providing numerous helpful suggestions. It is also appropriate to acknowledge Mr. Curtis C. Arnold of the Service Bureau Corporation for his work as the contract project leader.

IAPG: AN ITEM ANALYSIS PROGRAM FOR QUESTIONNAIRE—TYPE TEST INSTRUMENTS

I. INTRODUCTION

Item analysis programs are commonly used to determine the psychometric characteristics of test items in order to develop valid measuring instruments. In the case of aptitude or ability type tests, each item has a correct alternative; however, in biographical, interest, or opinion type questionnaires, no correct response is designated. Item Analysis Program, General (IAPG), which is a series of seven item analysis computer programs referred to in this report as IAPG 1 to 7, was developed specifically for use with measurement devices containing items for which the correctness or incorrectness of an alternative is not the same for all respondents.

In 1965, the Service Bureau Corporation was tasked under government contract to develop a computer program conforming to the IAPG methodology which was originally formulated at the Air Force Human Resources Laboratory (AFHRL). In 1966, follow-on research was completed by the Service Bureau Corporation and the IAPG programs were implemented on the IBM 7040 computer system at AFHRL (Service Bureau Corporation, 1966).

Since that time, IAPG has undergone several modifications. The purpose of this report is to acquaint the potential user with the capabilties of IAPG which has been updated for use on the UNIVAC 1108 computer system. Technical details are discussed that enable the user to take complete advantage of the analytical capabilities of IAPG. This information includes computational formulas, control and data card descriptions, file layouts, printed output samples, diagnostic messages, and run time examples.

The IAPG computer programs are constructed so that IAPG 1 to 4 and IAPG 5 to 7 can be run without interruption; however, the user may run any subset of either group of programs as long as the input requirements for each program are satisfied. The data set of responses, which is normally divided into three subsamples, can contain a maximum of five criteria.

The maximum number of alternatives allowed per item is six, with values ranging from one to six inclusive. A response for a k-alternative item, where the value of k may vary from item to item, is a set of k elements where a value of plus one is assigned to the selected alternative and a value of zero is assigned to every other alternative. No more than one alternative can be selected for each item. If the number of alternatives for each item is less than six, an above-range response (the alternative selected has a value greater than six) and/or omit response (no alternative was selected) can be considered as an additional alternative.

In the following sections, each of the programs is discussed in detail. The appendixes provide information concerning the various statistical computations and computer program specifics. The IAPG statistical/mathematical methodology is supported by the computational formulas provided in Appendix A. The description of the control and data cards, input/output file layouts, samples of the printed output and diagnostic messages are shown in Appendixes B to E, respectively. IAPG is a versatile program; however, it can be time consuming as shown in Appendix F.

II. METHODOLOGY AND ASSOCIATED INPUT/OUTPUT

IAPG 1

IAPG 1 accepts data in the form specified in Appendix B and produces the following results for each subsample:

1.Data Information Roster — This is printed output as shown in Appendix D containing the total number of cases, number of cases not eliminated, number of eliminated cases, number of cases with no omitted responses, number of cases with at least one omitted response, total number of omitted responses for all cases, and total number of undefined criteria for all cases. (If a case is deleted, an error message is printed giving the reason for the deletion. These error messages are shown in Appendix E.)

2.Response Proportions for Item Alternatives Roster — This is printed output for each item as shown in Appendix D and contains the item identification number, proportion of omitted responses, proportion of responses not omitted, and proportion of cases responding to each alternative. (The analyst can examine this table to locate items that have been omitted too frequently or that have alternatives associated with very high and/or low selection frequencies. An item can be deleted in IAPG 2.)

3.Case Omit Information Roster — This is printed output as shown in Appendix D and contains the case identification number, number of omitted items for each case, and identification numbers of omitted items. (The analyst can examine this table to locate cases with large numbers of omissions.)

4.Preliminary Response Data File (PRDF) — This is a file containing the information shown in Appendix C. (The word "file" refers to either a magnetic tape or a UNIVAC 1108 FASTRAN mass storage file.)

IAPG 2

IAPG 2 accepts the item elimination and case omission information specified in Appendix B and the Preliminary Response Data File developed in IAPG 1 as input. It produces the following results for each subsample. (If the option to consider above-range and/or omitted responses as valid response alternatives is selected, the set of response alternatives is augmented by one; however, the augmented set must contain less than seven response alternatives.)

1. Item Summary Information Roster — This is printed output as shown in Appendix D and contains the number of cases not eliminated, number of items not eliminated, total number of omitted responses for all cases, number of criteria, criterion identification number, criterion mean, criterion standard deviation, number of criterion values, and the correlations between the alternatives of each item. The mean, standard deviation, point-biserial and biserial correlation coefficients, and .01 and .05 significance keys are printed for each item alternative. (The term ".01 and .05 significance keys" is defined in Appendix A.)

2. Item Summary Information File (ISIF) — This is a file containing the information shown in Appendix C.

3. Final Response Data File (FRDF) — This is a file containing the information shown in Appendix C.

IAPG 3

IAPG 3 accepts the control card information specified in Appendix B and the Item Summary Information File developed in IAPG 2 as input and produces the following results for each subsample.

1. Item Key File (IKF) — This is a file containing the information shown in Appendix C.

2. Roster of Significance Keys and Validities — This is printed output for each criterion/significance level (.01 and .05) combination as shown in Appendix D. It contains the item identification number (including identification numbers for dummy items), sequential item count, significance key for each item alternative, item validity, number of items (excluding dummy items) containing at least one nonzero alternative significance key, and number of dummy items.

For each item significance key (which is the composite of the item alternative significance keys) containing only two of the three possible values (+ 1, -1, 0), dummy items are created in the following manner: (a) if the item significance key is comprised of + 1 and 0 values, the dummy item significance key is identical except that -1 is substituted for each 0; (b) if the item significance key is comprised of -1 and 0 values, the dummy item significance key is identical except that + 1 is substituted for each 0 and (c) if the item significance key is comprised of + 1 and -1 values, the dummy item significance key is identical except that 0 is substituted for each -1. The dummy item identification number is the original item identification number suffixed by the letter "A." A dummy item has the same item validity as the original item. Each dummy item that is formed yields an additional item key that may be used in the item composite buildup in IAPG 6.

3. Roster of Pattern Keys and Validities — This is printed output for each criterion as shown in Appendix D. It contains the item identification number, keying patterns yielding the five highest item validities, item validities corresponding to those keying patterns, and number of dummy items.

a. Each element of a keying pattern must assume one of the following three values: + 1, -1, or 0.

b. Dummy item keys are created only for the keying pattern yielding the highest item validity.

c. If the item validity for a keying pattern is negative, the signs of all of the elements of the keying pattern are reversed to yield a positive item validity of the same magnitude.

d. A method for generating unique keying patterns is given by Bottenberg and Christal (1964); therefore, item validities do not have to be calculated for all of the 3^k ways in which a k-alternative item can be keyed.

4. Roster of Least Squares Weights and Validities — That is printed output for each criterion as shown in Appendix D. It contains the item identification number, multiple correlation coefficient (item validity), significance of the item validity at the .05 level, least squares weight for each item alternative, and number of items with significant item validities. (Any combination of the three types of keying options may be run.)

IAPG 4

The input to IAPG 4 is the control card information specified in Appendix B and the Item Summary Information File and Item Key File developed in IAPG 2 and IAPG 3, respectively.

IAPG 4 calculates item validities by using the item keys from one subsample and the item alternative standard deviations, item alternative point-biserial correlation coefficients and correlations between the alternatives of each item from a different subsample. The Item Key File and Item Summary Information File may contain information on two different criteria. Dummy items are not used in the cross-validation calculations because the resulting information would be the same as for the original items. Any item existing in one but not in the other subsample involved in the cross validation is not considered. The Roster of Unmatching Items is printed output which contains the items that are not defined in both the Item Key File and the Item Summary Information File for each pair of subsamples involved in a cross validation.

For three subsamples, IAPG 4 produces a Roster of Item Keys, Validities, and Cross Validities as shown in Appendix D for each of the following subsample combinations: (a) the Item Key File for subsample 1 and the Item Summary Information Files for subsamples 2 and 3, (b) the Item Key File for subsample 2 and the Item Summary Information Files for subsamples 1 and 3, and (c) the Item Key File for subsample 3 and the Item Summary Information Files for subsamples 1 and 2; therefore, six rosters are printed for each criterion/keying option combination. Each Roster of Item Keys, Validities, and Cross Validities contains the identification number, cross validity, validity, difference between the cross validity and validity, and key for each item.

IAPG 5

The input to IAPG 5 is the control card information specified in Appendix B and the Final Response Data File and Item Key File developed in IAPG 2 and 3, respectively. For three subsamples and a single criterion/keying option combination, IAPG 5 produces the Roster of Item Changes/Deletions and Keyed Item Response File Counts and a Keyed Item Response File (KIRF) for each of the following subsample combinations: (a) the Item Key File for subsample 1 and the Final Response Data Files for subsamples 1, 2, and 3, (b) the Item Key File for subsample 2 and the Final Response Data Files for subsamples 1, 2, and 3, and (c) the Item Key File for subsample 3 and the Final Response Data Files for subsamples 1, 2, and 3. As an option on the Main Control Card, the user may request that Keyed Item Response Files be produced from only the Item Key Files and Final Response Data Files of interest.

The Roster of Item Changes/Deletions and Keyed Item Response File Counts is printed output as shown in Appendix D containing the Keyed Item Response File identification number, the subsample identification numbers for the Item Key File and Final Response Data File, the reason a particular subset of items was eliminated, and the identification numbers and total number of items in the associated subset. For each item key change specified by the user, it also lists the item identification number and new item key.

1. An item is eliminated in IAPG 5 if it has an all zero key, or if it is not defined in both the Final Response Data File and the Item Key File for a particular subsample combination.

2. The options available to the user are changing item keys (applies only to original items) and eliminating any subset of the original items. For each item that is eliminated or has its key changed, the associated dummy item will be deleted.

The Keyed Item Response File is a file containing the information shown in Appendix C. The maximum direct access file size, which is used in IAPG 6, is printed. If IAPG 5 to 7 are run consecutively without interruption, this value is automatically passed to IAPG 6; however, if IAPG 5 and 6 are run separately, the value must be present on the Main Control Card.

IAPG 6

The input to IAPG 6 is the control card information specified in Appendix B and the Keyed Item Response Files developed in IAPG 5. IAPG 6 produces unit weighted item composites by selecting items that yield the largest increase, or minimum decrease if none of the available items yield an increase, in composite validity for each iteration of the composite buildup. After each iteration, one additional item with a weight of plus or minus one is included in the composite; however, the user may select an option on the Main Control Card that will allow only positive unit weights to be used in the composite buildup. The item having the largest item validity is selected on the first iteration. Items are not available for selection if they have negative item validities. If an original item becomes an element of the composite, then the dummy item associated with it is not eligible to become an element of the same composite; likewise, if a dummy item becomes an element of the composite, then the original item associated with it is not eligible to become an element of the same composite. When an item becomes an element of the composite, it is permanently removed from the pool of available items for that composite. IAPG 6 produces the following results:

1. Item Selection Sequence Roster — This is printed output as shown in Appendix D containing the iteration number, identification number, and sign (blank indicates plus) of the item selected, composite validity, mean, and standard deviation, item validity, criterion mean and standard deviation, number of iterations, iteration number corresponding to the largest composite validity, number of items defined in the Keyed Item Response File, number of original items with negative validity, number of dummy items with positive validity, number of dummy items with negative validity, and number of items that may be used in the generation of the composite. If the composite validity decreases for at least one iteration, then the printed output also contains the iteration number corresponding to the first decrease in composite validity and the number of iterations in which the composite validity decreased.

2. Item Selection Sequence File — This is a file containing the information shown in Appendix C.

IAPG 7

The input to IAPG 7 is the control card information specified in Appendix B, the Keyed Item Response File (generated from the subsample i Item Key File and the subsample j Final Response Data File) developed in IAPG 5, and the Item Selection Sequence File (generated by the Keyed Item Response File for the subsample i Item Key File and the subsample k Final Response Data File) developed in IAPG 6. IAPG 7 generates an item composite for the Keyed Item Response File; however, the item composite must be identical to the one in the Item Selection Sequence File.

For three subsamples, IAPG 7 can generate two item composites (one for each Keyed Item Response File generated from the Item Key File for subsample i and the Final Response Data File for subsample j =k) for each item composite defined in an Item Selection Sequence File. IAPG 7 produces the Roster of Item Selection Cross Validation as shown in Appendix D which contains the sequential item count, identification number and sign (blank indicates plus) of the item added, item validity from the Item Selection Sequence File, item validity from the Keyed Item Response File, number of cases in the Keyed Item Response File, the criterion mean and standard deviation, and the validity of the composite produced in IAPG 6. It also contains the mean, standard deviation, and validity of the composite produced in IAPG 7.

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APPENDIX A: COMPUTATIONAL FORMULAS

IAPG 1

Definitions of symbols

N = total number of cases (individuals)

X_{ijk} = the response of the k^{th} individual to the j^{th} alternative of the i^{th} item (response = 1 if alternative selected, 0 otherwise)

Formulas

PCR_{ij} = the proportion of cases responding to the j^{th} alternative of the i^{th} item

$$= \frac{\sum_{k=1}^{N} X_{ijk}}{N}$$

IAPG 2

Definitions of symbols

N_c = number of cases with values for the c^{th} criterion

Y_{ck} = the c^{th} criterion value for the k^{th} individual

N_{ij} = the number of cases with values for the c^{th} criterion responding to the j^{th} alternative of the i^{th} item

$$= \sum_{k=1}^{N_c} X_{ijk}$$

X_{ijk} = the response of the k^{th} individual to the j^{th} alternative of the i^{th} item

Formulas

$\overline{X_{ij}}$ = the mean of the j^{th} alternative of item i

$$= \frac{N_{ij}}{N_c}$$

SD_{ij} = standard deviation of the j^{th} alternative of item i

$$= \sqrt{\overline{X}_{ij}\,(1 - \overline{X}_{ij})}$$

$\overline{Y}_c$ = the c^{th} criterion mean

$$= \frac{\sum_{k=1}^{N_c} Y_{ck}}{N_c}$$

SD_c = standard deviation of the c^{th} criterion

$$\sqrt{\frac{\sum_{k=1}^{N_c} Y_{ck}^2}{N_c} - \overline{Y}_c^2}$$

$i^r ab$ = the correlation between alternatives a and b of item i

$$= -\sqrt{\frac{\overline{X}_{ia}\,\overline{X}_{ib}}{(1 - \overline{X}_{ia})\,(1 - \overline{X}_{ib})}}$$

PB_{ijc} = the point-biserial correlation between criterion c and the j^{th} alternative of item i

$$= \frac{\sum_{k=1}^{N_c} X_{ijk}\,Y_{ck} - N_c\,\overline{X}_{ij}\,\overline{Y}_c}{N_c\,SD_c\,SD_{ij}}$$

PB_{ijc} is significant at the .05 (or .01) level if

$$\frac{PB_{ijc}\,\sqrt{N_c - 2}}{\sqrt{1 - PB_{ijc}^2}} \geq \left\{ \begin{array}{l} 5\% \text{ (or } 1\%) \text{ level of the distribution of t with} \\ N_c - 2 \text{ degrees of freedom.} \end{array} \right.$$

The value of the .05 (or .01) significance key is: + 1 if the point-biserial coefficient of correlation is positive and significant at the .05 (or .01) level, -1 if the point-biserial coefficient of correlation is negative and significant at the .05 (or .01) level, and 0 if the point-biserial coefficient of correlation is not significant.

B_{ijc} = the biserial correlation between criterion c and the j^{th} alternative of item i

$$= \frac{PB_{ijc}\, SD_{ij}}{Z}$$

Where Z = the ordinate of the unit normal distribution curve at the point of division between segments containing p and q ($\overline{X}_{ij}$ and $1-\overline{X}_{ij}$) proportions of the cases. Z may be computed (Hastings, 1955) as follows:

if $\overline{X}_{ij} \leq .5$ set $Q = \overline{X}_{ij}$ and $SWT = 1$

if $\overline{X}_{ij} > .5$ set $Q = 1-\overline{X}_{ij}$ and $SWT = -1$

$$\text{then } W = \sqrt{\log_e (1/Q^2)}$$

$$T = SWT \left(W - \frac{2.515517 + .802853W + .010328W^2}{1 + 1.432788W + .189269W^2 + .001308W^3} \right)$$

$$Z = \frac{e^{-(1/2)T}}{\sqrt{2\pi}}$$

IAPG 3

Definitions of symbols

Wt_{ij} = the key (weight) of the j^{th} alternative of the i^{th} item

PB_{ijc} = the point-biserial correlation between the j^{th} alternative of the i^{th} item and criterion c

SD_{ij} = the standard deviation of the j^{th} alternative of the i^{th} item

$NALT_i$ = number of alternatives for the i^{th} item

$i^{r}ab$ = the correlation between alternatives a and b of item i

N_{ij} = the number of cases with values for the c^{th} criterion responding to the j^{th} alternative of the i^{th} item

Formulas

Significance and pattern keys

r_{ic} = item validity, correlation between criterion c and item i

$$= \frac{SUMCCV_i}{\sqrt{CSDSQ_i}}$$

where:

$$SUMCCV_i = \sum_{j=1}^{NALT_i} Wt_{ij}\, PB_{ijc}\, SD_{ij}$$

$$CSDSQ_i = \sum_{j=1}^{NALT_i} |Wt_{ij}|\ SD_{ij}^2 + 2 \sum_{a=1}^{NALT_i-1} \sum_{b-a+1}^{NALT_i} {}_i r_{ab}\, Wt_{ia}\, Wt_{ib}\, SD_{ia}\, SD_{ib}$$

Least squares weights

$WEIGHT_{ij}$ = the weight for the j^{th} alternative of the i^{th} item

$$= \frac{\sum_{k=1}^{N_c} X_{ijk} Y_{ck}}{N_{ij}}$$

r_{ic} = item validity, multiple correlation between criterion c and the alternatives of item i

$$= \sqrt{\frac{\sum_{j=1}^{NALT_i} N_{ij}\, WEIGHT_{ij}^2 - N_c \overline{Y}_c^2}{N_c\, SD_c^2}}$$

r_{ic} is significant at the .05 level if

$$\frac{r_{ic}^2 (N_c - NALT_i)}{(NALT_i)(1-r_{ic}^2)} \geq \left\{ \begin{array}{l} \text{5\% level of the distribution of F with } NALT_i \text{ and } N_c - \\ NALT_i \text{ degrees of freedom.} \end{array} \right.$$

IAPG 4

Formulas

r_{ic} = cross validity, the correlation between item i and criterion c. The formula for r_{ic} is identical to the formula in IAPG 3 for the item validity resulting from the use of significance and pattern keys.

IAPG 5

Definitions of symbols

N_c = the number of cases with valid values for the c^{th} criterion

Y_{ck} = the value of the c^{th} criterion for the k^{th} individual

$\overline{Y}_c$ = the mean of the c^{th} criterion

S_{ik} = the score (weighted response) of the i^{th} item for the k^{th} individual. It is the element of the item key corresponding to the alternative that was selected as the response to the item.

SD_c = standard deviation of the c^{th} criterion

Formulas

$\overline{S}_i$ = the mean of the scores of the i^{th} item

$$= \frac{\sum_{k=1}^{N_c} S_{ik}}{N_c}$$

SD_i = the standard deviation of item i

$$= \sqrt{\frac{\sum_{k=1}^{N_c} S_{ik}^2}{N_c} - \overline{S}_i^2}$$

r_{ic} = the correlation between criterion c and item i

$$= \frac{\sum_{k=1}^{N_c} S_{ik} Y_{ck} - N_c \overline{S_i}\,\overline{Y_c}}{N_c SD_i SD_c}$$

IAPG 6

Definitions of symbols

N_c = the number of cases with values for the c^{th} criterion

W_k = unit weight used when the k^{th} item enters the composite (Note: W is + 1 or -1; therefore, $W_k^2 = 1$)

$\overline{S_k}$ = the mean of item k

S_{kn} = the score of the k^{th} item for the n^{th} individual

SD_k = the standard deviation of item k

L = the number of items in the composite

r_{kc} = correlation between item k and criterion c

Formulas

AMEAN = the mean of a composite containing L items

$$= \sum_{k=1}^{L} W_k \overline{S_k}$$

SD_{co} = the standard deviation of a composite containing L items

$$= \sqrt{\sum_{k=1}^{L} SD_k^2 + 2 \sum_{k=1}^{L-1} \sum_{m=k+1}^{L} \left(\frac{\sum_{n=1}^{N_c} S_{kn} S_{mn}}{N_c} - \overline{S_k}\overline{S_m} \right) W_k W_m}$$

$r_{c,co}$ = composite validity, the correlation between the criterion and a composite containing L items

$$= \frac{\sum_{k=1}^{L} W_k \, r_{kc} \, SD_k}{SD_{co}}$$

IAPG 7

Definitions of symbols

L = number of items in the composite

W_k = the unit weight (+ 1 or -1) used to add the k^{th} item to the composite.

S_{kn} = the n^{th} individual's score for the k^{th} item.

$\overline{Y}_c$ = the mean of the c^{th} criterion

SD_c = the standard deviation of the c^{th} criterion

N_c = the number of cases with values for the c^{th} criterion

AMEAN = the mean of a composite containing L items

SIGMA = the standard deviation of a composite containing L items

$$= \sqrt{\frac{\sum_{n=1}^{N_c} \left(\sum_{k=1}^{L} W_k \, S_{kn} \right)^2}{N_c} - AMEAN^2}$$

CVALID = the composite validity, the correlation between the criterion and a composite containing L items

$$= \frac{\frac{\sum_{n=1}^{N_c} \left(Y_{cn} \sum_{k=1}^{L} W_k \, S_{kn} \right)}{N_c} - (AMEAN)(\overline{Y}_c)}{SIGMA \; SD_c}$$

APPENDIX B: DESCRIPTION OF CONTROL AND DATA CARDS

Package 1 (IAPG 1 to 4) Cards: There are eight types of control/data cards involved in IAPG 1 to 4. Five are required and three are optional. The order in which they are described is the order in which they *must* appear if needed.

NOTE 1: Blanks and zeroes are interchangeable unless stated otherwise.
NOTE 2: All numerical entries should be right justified unless stated otherwise.

Main Control Card, required

cc	Description	Program Used
1-6	Card Identification must be "CONTRL"	
7	1 if program 1 to be run, blank otherwise	
8	2 if program 2 to be run, blank otherwise	
9	3 if program 3 to be run, blank otherwise	
10	4 if program 4 to be run, blank otherwise	
11	Number of subsamples (if blank, assumes 3)	
12	0 if omits and above-range invalid (above-range recoded to omit and case eliminated in IAPG 2) 1 if omits valid, above-range invalid (case eliminated immediately after detection in IAPG 1) 2 if omits and above-range valid (above-range recoded to omit)	IAPG 1
13	1 if user desires to eliminate any items, blank otherwise	IAPG 2
14	1 if .01 and .05 keys wanted, blank otherwise	IAPG 3
15	2 if pattern keys wanted, blank otherwise	IAPG 3
16	3 if least squares weights wanted, blank otherwise	IAPG 3
17-21	Criteria wanted (in sequence, left justified in field), blank otherwise (assumes 1,2,3,4,5)	IAPG 3
23	1 if .01 keys to be cross validated, blank otherwise	IAPG 4
24	2 if pattern keys to be cross validated, blank otherwise	IAPG 4
25	3 if least squares weights to be cross validated, blank otherwise	IAPG 4
26	4 if .05 keys to be cross validated, blank otherwise	IAPG 4
27	An entry in this column indicates that criterion 1 of the ISIF is to be cross validated with an IKF criterion. The value of the entry is the ID of the IKF criterion.	IAPG 4
28	Similar to column 27, but criterion 2	IAPG 4
29	Similar to column 27, but criterion 3	IAPG 4
30	Similar to column 27, but criterion 4	IAPG 4
31	Similar to column 27, but criterion 5	IAPG 4
32-35	"NOGO" option, if the letters "NOGO" are here, the program will analyze the control cards and print a description of the parameters and operations to be performed. If IAPG 1 is included in the "NOGO" test, control cards for each subsample will be scanned. Data cards must not be present when using this option.	
36	1 if checkpoint requested every hour (wall clock), blank otherwise	

Title Card(s), required

The first title card will appear at the top of every page of output. As many cards as desired may be used for title purposes. Subsequent title cards will appear only on the first page of output. Card column 1 must contain standard FORTRAN control characters (printer line control) and columns 2 to 79 will be printed exactly as punched.

End Title Card, required

A card containing "END TITLE" starting in col 2 must follow the title card(s).

Data Control Cards, required for each subsample

cc	Description
1-6	"CNTRL1" (card identification)
10-11	Card number (01, 02, etc.)
	For Card 01 (Subsample Parameters)
12	Input unit for data, 5 =cards, 3 =tape or mass storage (FORTRAN or COBOL formatted files). If data are on a COBOL file, see columns 29 to 32.
13-16	Number of items per case (The input to IAPG 1 can consist of a maximum of 950 items per case — see Appendix F for computer run time considerations)
17	Number of criteria
18-23	Maximum number of cases allowed to be eliminated. Run terminates if exceeded.
24-28	Identification numbers of criteria to be used (left justified in field)
29-32	Block size if COBOL file (max =2500). LRL of file must be 14, i.e., card images.
	For Cards 02 and on (Maximum Response Values)
12-72	Maximum responses for items in the sequence in which they occur. (61 one-digit fields). Number of cards needed determined by number of items per case. Card 02 contains maximum responses for items 1 through 61 and card 03 starts with item 62.

Data Cards, optional, data could be on tape

If the data is on tape, it will be as card images with the same layout as the data cards. If cards are requested, they will be placed immediately following the appropriate data control cards.

NOTE: The input to IAPG 1 can consist of a maximum of 9,999 cases per subsample. See Appendix F for computer run time considerations.

cc	Description
1-9	Case identification
10-11	Card number
	For Card 01 (Criterion Card)
12-23	Value of criterion 1 in F12.8 format (must have either explicit decimal point or understood decimal point between the 4th and 5th positions from the left of the field)
24-35	Value of criterion 2
36-47	Value of criterion 3
48-59	Value of criterion 4
60-71	Value of criterion 5

NOTE: An omitted criterion must be indicated by a blank.

	For Cards 02 and on (Response Card)
12-72	Item responses in sequence, 61 per card

NOTE 1:
An omitted response is indicated by a blank.

NOTE 2: End of subsample is indicated by a data card with 9s filling the case ID field. This card is required.

Item Elimination Cards, optional, used in IAPG 2 to eliminate items

The cards contain identification numbers of items to be eliminated (right justified in three-character fields, 24 items per card). Read stops upon encountering a blank field. If the number of items to be eliminated is a multiple of 24, there must be a blank card following to stop the read.

NOTE: The item elimination cards for subsample 1 are first, subsample 2, second and subsample 3, third. If items are not to be eliminated from a subsample and the item elimination code on the Main Control Card is 1, then a blank card must be supplied for that subsample.

Package 2 (IAPG 5 to 7) cards: This package has three required types of cards and two optional types. They are described in the order that they are used.

Main Control Card, *required*

cc	Description
1-6	"CONTRL" (card ID)
37-40	"NOGO" only for control card test
41	5 if IAPG 5 to be run, blank otherwise
42	6 if IAPG 6 to be run, blank otherwise
43	7 if IAPG 7 to be run, blank otherwise
44	1 if .01 keys to be used 2 if pattern keys to be used 3 if least squares weights to be used 5 if .05 keys to be used

NOTE: Serious consideration should be given before using least squares weights in IAPG 5 to 7 due to the possibility of multiple-file, multiple-reel problems.

45	Criterion ID
46	1 if user will eliminate items, blank otherwise
47	1 if user will change keys, blank otherwise
48	Stop option If blank, assumes option 1 1 causes stop after item pool exhausted or 200 items are in the composite 2 causes stop after X (col 51 to 53) items are in the composite 3 causes stop on Xth (col 51 to 53) iteration after the first decrease in the composite validity 4 causes stop if no change in the Xth (col 51 to 53) decimal place of the composite validity or on the first decrease 5 causes stop after the first decrease in composite validity after X (col 51 to 53) items have entered Options 2 thru 5 will also stop on fulfillment of Option 1.
49	Total number of subsamples in FRDF (if blank, assumes 3)
50	Total number of subsamples in IKF (if blank, it is set equal to col 49)
51-53	Associated with stop option (col 48)
54-56	Subsample sequence for IKF (assumes 1,2,3)
59-61	Subsample sequence for FRDF (assumes 1,2,3)
62	1 if only positive unit weighting requested for composite buildup, blank otherwise
64	1 if checkpoint requested every hour (wall clock), blank otherwise
65-69	MAXREC Maximum number of records to be written on the direct access file in IAPG 6. The field may be blank if IAPG 5 and 6 are run together. If IAPG 6 is run separately from IAPG 5, the value read here should be the number appearing in the last message printed by IAPG 5 — "DIRECT ACCESS FILE SIZE =XXXXX".

Title Card(s), required

The same as in package one.

End Title Card, required

The same as in package one.

Key Change Cards, optional

cc	Description
1-4	ID of item that is to have its key changed
5-16	New key for alternative 1 (assumes F12.8 format)
17-28	New key for alternative 2 (assumes F12.8 format)
29-40	New key for alternative 3 (assumes F12.8 format)
41-52	New key for alternative 4 (assumes F12.8 format)
53-64	New key for alternative 5 (assumes F12.8 format)
65-76	New key for alternative 6 (assumes F12.8 format)

NOTE: Read stops upon encountering a blank case ID field.

Item Elimination Cards, optional

Cards contain ID numbers of items to be eliminated (right justified in four-character fields, 20 items per card for as many cards as are necessary). Read stops upon encountering a blank field. If the number of items to be eliminated is a multiple of 20, there must be a blank card following the last item elimination card to stop the read.

NOTE: The item elimination cards for subsample 1 are first, subsample 2, second and subsample 3, third. If items are not to be eliminated from a subsample and the item elimination code on the Main Control Card is 1, a blank card must be supplied for that subsample.

NOTE: The input to IAPG 5 can consist of a maximum of 1500 items (original and dummy); however, no more than 500 items may remain after all program and user requested eliminations.

APPENDIX C: FILE LAYOUTS

TAPE LAYOUT

TAPE LAYOUT

FILE: PRDF - IAPG 1-4 SHEET 1 OF 1

(Per subsample), EOF at end of each subsample

LABELS: ~~STANDARD/NONE/SPECIAL~~ MODE: ~~BCD/BIN~~ DENSITY: 556/~~800~~ BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: ~~TOAO/CONSECUTIVE~~

LAYOUT PREPARED BY _____ DATE _____

X	Record (1)	wd wd	(11 + NITEM) to (10 + 2 x NITEM) List of max. responses for each item	1	Case Id of "000999999999"
1	N = number of cases in subsample	X	Records (2) to (N + 1)	2	
2	NCRT = number of criteria in subsample	1	Case Ident.	3 to 88	Repeat of last record
3	NITEM = number of items per case in sub-sample	2			
4	IOMIT indicates if omits and/or above-range are valid.	3 to 82	Packed responses		
5	NTOMIT = total number of omitted items	83	Number of omitted items this case		
6 to 10	IDCRIT = criterion ID list	84 to 88	Criterion values		
11	(10 + NITEM) List of items in subsample	X	Record (N + 2)		

APPRL FORM 22 AUG 69 REPLACES PRL HQ-D 72 JUN 63 WHICH MAY BE USED

TAPE LAYOUT

TAPE LAYOUT

FILE: ISIF - IAPG 1-4 SHEET 1 OF 2

Per subsample

LABELS: STANDARD/NONE/SPECIAL DENS: ~~800~~/1600 DENSITY: 556/800-~~1600~~

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: ~~7040~~/COMMERCIAL

LAYOUT PREPARED BY _____ DATE _____

	Record (1)		Record (3)		Records (5) - to (4+ Items*ALTS) 1 for each item/alt combination
1	Number of cases in subsample	wds 1	to NITEM max. response for each item in subsample	1	Criterion ID
2	Number of criteria in subsample		Record (4)	2	Item number
3	Number of items per case in subsample	1	Criterion mean	3	Item Alternative ID
4	Indicates if omits and/or above-range are valid	2	Criterion standard deviation	4	Item Alternative S.D.
5	Total number of omits	3	Criterion N	5	Item Alternative Validity
	Record (2)	4	Criterion ID	6	.01 signif. key
wds 1	to NITEM List of item numbers in subsample	wds 5	to 4 * NCRT words 1 - 4 are repeated for each criterion	7	.05 signif. key

APHRL FORM 88 AUG 80 REPLACES PT-HQ-0 22 JUN 63 WHICH MAY BE USED

TAPE LAYOUT

FILE: ISIF - IAPG 1-4 SHEET 2 OF 2

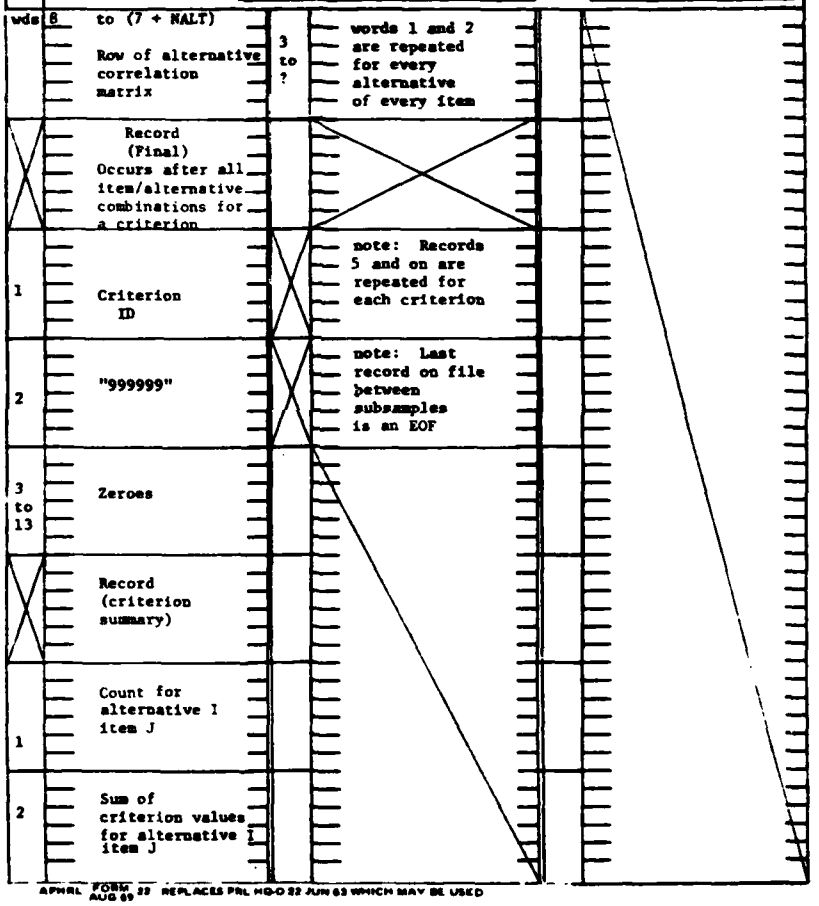
Per subsample

LABELS: ~~STANDARD~~/~~NONE~~/SPECIAL NODE: ~~BCD~~/BIN DENSITY: 556/~~800~~-BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: ~~TOTO~~/~~CONSECUTIVE~~

LAYOUT PREPARED BY _____ DATE _____



APHRL FORM 22 AUG 69 REPLACES PRL HQ-O 22 JUN 63 WHICH MAY BE USED

TAPE LAYOUT

TAPE LAYOUT

FILE: FEDF - IAPG 1-4 and IAPG 5-7 SHEET 1 OF 1

(per subsample), EOF at end of each subsample

LABELS: ~~STANDARD/NONE/SPECIAL~~ NONE: ~~BCD/BIN~~ DENSITY: ~~556/800-BPI~~

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: ~~TOAD/COMMERCIAL~~

LAYOUT PREPARED BY _____ DATE _____

X	Record (1)	wds 1	to NITEM List of items remaining in subsample	X	Record (N + 4)
1	Number of cases in subsample	X	Record (3)	1	Case ID. of "000999999999"
2	Number of criteria in subsample	wds 1	to NITEM List of max. responses for remaining items	2	
3	Number of items per case in subsample	X	Records (4) to (N + 3)	3 to 87	Repeat of last record
4	Indicates if omits and above-range are valid	1	Case Ident.		
5	Total number of omits	2			
6 to 10	Criterion list	3 to 82	Packed responses		
X	Record (2)	83 to 87	Criterion values		

APHRL FORM 22 AUG 80 REPLACES PRL HSD 22 JUN 83 WHICH MAY BE USED

TAPE LAYOUT

TAPE LAYOUT

FILE. IKr - IAPG 1-4 and IAPG 5-7 SHEET 1 of 2

LABELS: STANDARD/NONE/SPECIAL MODE: BCD/BIN DENSITY: 556/200-BPI

____ REELS, ________ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR ___

SEQUENCE: FOBO/COMMERCIAL

LAYOUT PREPARED BY ________ DATE ________

X	Record (1)	3	Item number	4	blanks
1 to 3	Keying options	4	Item status "SIGNIF" = signif " " = Non-Sig "ADUMMY" = dummy	5	0.0
4 to 8	List of criterion IDs	5	Item validity for this criterion	6	Total item count
9 to 12	"Standard Item Key File"	6 to 10	Keys for this item (non-existing *alternatives*, the excess, have 9999 as key)	7	Count of items with nonzero *keys*
X	Records (2) and on appear for each item and dummy item, for each criterion, and for each keying	X	Record (at end of each criterion/ keying option combination) .01, pattern, and .05	8	
X	option See note at end of description	1	Label	9	count of dummy items
1	Label 1 1 = .01 key 1 2 = .05 key 2 1 = pattern 3 1 = LST Sq	2	Criterion ID	10	
2	Criterion ID	3	999999	11	zero

[illegible] FORM [illegible] REPLACES [illegible] WHICH MAY BE USED.

TAPE LAYOUT

TAPE LAYOUT

FILE [illegible] TAPE 1-4 and TAPE 5-7 SHEET __ OF __

Per subsample

LABELS: STANDARD/NONE/SPECIAL NODE: BCD/BIN DENSITY: 556/800 BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: TOAD/COMMERCIAL _____

LAYOUT PREPARED BY _____ DATE _____

	Record at end of each criterion/ keying option combination (least squares weights)	1. Significance keying 2. Pattern keying 3. Least squares weights ----------
1 to 4	Same as previously described for other keys	Within each option the items will be in sequence with the dummy (if present) immediately following the regular item. The significance keys contain both the .01 and .05 keys (in that order).
5	Count of items with nonzero weights	
6	Count of items with significant weights	Example: item 1 .01 key item 1 .05 key item 1 .01 dummy item 1 .05 dummy
7 to 11	Zeroes	
		TM (EOF) occurs at the end of each subsample
	NOTE: Records of this type (2 and on) will be repeated at most 3 times (once for each keying option) within each criterion. They will be as follows:	

APHRL FORM 22 AUG 69 REPLACES PRL HQ-O 22 JUN 63 WHICH MAY BE USED

TAPE LAYOUT

TAPE LAYOUT

FILE: KIRO TAPE 5-7 SHEET 1 OF 2

for each combination of IKF and FRDF

LABELS: STANDARD/NONE/SPECIAL MODE: BCD/BIN DENSITY: 556/800 BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: FIXED/CONSECUTIVE

LAYOUT PREPARED BY _____ DATE _____

	Record (1)	8	Criterion Mean		Record (5)
1	Sequence Number File	9	Criterion Standard Deviation	wds 1 to NITEM	List of item validities
2	IKF Subsample ID		Record (2)		Records (6) to (N+5) for keys 1, 2, 5
3	FRDF Subsample ID	wds 1 to NITEM	List of item IDs (all dummies have 1000 added to their regular item ID's)	1 to 34	Packed weighted responses
4	Number of Cases in File		Record (3)	35	Criterion Value
5	Number of Items in File	wds 1 to NITEM	List of item Means	36 to 37	Case ID
6	Keying option		Record (4)		Records (6) to (N+5) for key 4
7	Criterion ID	wds 1 to NITEM	List of item Standard Deviations	wds 1 to NITEM	Responses weighted by least squares weights

ARMRL FORM 22 AUG 67 REPLACES PRL HQ O 22 JUN 63 WHICH MAY BE USED

TAPE LAYOUT

TAPE LAYOUT

FILE: KIST - TAPE 5-7 SHEET 1 OF 1

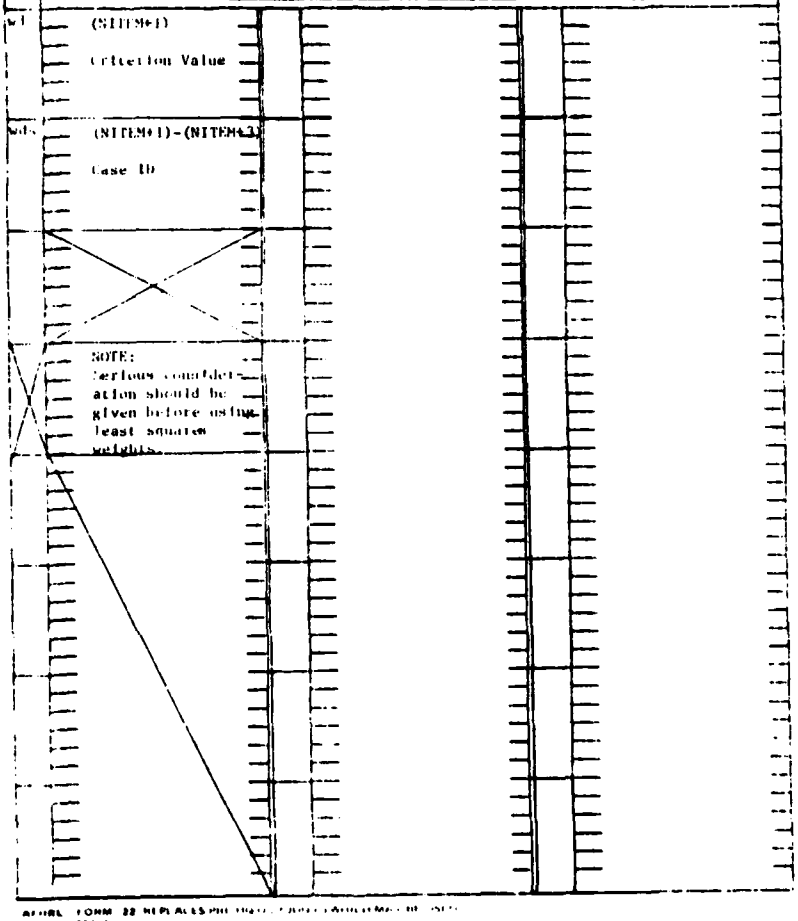
For each combination of IKF and FRDF

LABELS: STANDARD/NONE/SPECIAL MODE: BCD/BIN DENSITY: 556/800 BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR ___

SEQUENCE: TOMO/CONSECUTIVE

LAYOUT PREPARED BY _____ DATE _____



AFHRL FORM 22 REPLACES PREVIOUS EDITION WHICH IS OBSOLETE
MAR 70

TAPE LAYOUT

TAPE LAYOUT

FILE: ISSF - IAPG 5-7 SHEET 1 OF 1

See Note

LABELS: ~~STANDARD/NONE/SPECIAL~~ MODE: ~~BCD/BIN~~ DENSITY: 556/~~800~~ BPI

____ REELS, _____ RECORDS, ____ WORDS PER RECORD, BLOCKING FACTOR __

SEQUENCE: ~~TOLO/COMMERCIAL~~

LAYOUT PREPARED BY _____ DATE _____

1	KIRF Sequence Number	wd	(2NITEM+7) Number of iterations in col. 2 roster)
2	IKF Subsample ID	wd	(2NITEM+8) Number of iterations in col. 3 roster
3	FRDF Subsample ID	wd	(2NITEM+9) Number of iterations in col. 4 roster
4	Number of Items in KIRF	wds	(2NITEM+10) to (2NITEM+809) Item sequence list
5	KPATRN The order or pattern in which the cols. were computed	wds	(2NITEM+810) to (2NITEM+1609) Unit weights for the above items
wds	(6) to (NITEM+5) List of items		NOTE: The two lists above are each composed of 4 lists (200 wds each) for each col.
wds	(NITEM+6) to (2NITEM+5) List of item validities		
wd	(2NITEM+6) Number of iterations in col. 1 roster		NOTE: There will be NUMIKF times NUMFRDF of the above record followed by the table of composite validities

AFM 31 FORM 22 REPLACES PRL HQ O 22 JUN 63 WHICH MAY BE USED MAR 70

APPENDIX D: PRINTED OUTPUT SAMPLE

```
                    SMALL DATA SAMPLE FOR 1100 TEST                                                    PAGE    1


THE PROGRAM INTERPRETS THE CONTROL CARD TO BE THE FOLLOWING

          3  DATA SAMPLES ARE TO BE USED

          PROGRAM 1 IS TO BE RUN  ----------------------------------------------------------------

               OUT OF RANGE RESPONSES WILL CAUSE CASE ELIMINATION

          PROGRAM 2 IS TO BE RUN  ----------------------------------------------------------------

               UNITS ARE VALID

          PROGRAM 3 IS TO BE RUN  ----------------------------------------------------------------

               SIGNIFICANCE KEYING IS REQUESTED
               PATTERN KEYING IS REQUESTED
               LEAST SQUARES WEIGHTS ARE REQUESTED
               CRITERION NO. 1 IS TO BE KEYED
               DUMMY KEYS ARE REQUESTED

          PROGRAM 4 IS TO BE RUN  ----------------------------------------------------------------

               .01 SIGNIFICANCE KEYS WILL BE CROSS VALIDATED
               PATTERN KEYS WILL BE CROSS VALIDATED
               LEAST SQUARES WEIGHTS WILL BE CROSS VALIDATED
               .05 SIGNIFICANCE KEYS WILL BE CROSS VALIDATED
               CRITERION NO. 1 FROM SUMMARY FILE TO BE CROSS-VALIDATED WITH CRITERION NO. 1 FROM KEY FILE
```

DATA INFORMATION ROSTER FOR SAMPLE NO. 2

TOTAL NUMBER OF CASES PROCESSED (INCLUDING THE CASES THAT WERE ELIMINATED) = 75

TOTAL NUMBER OF CASES AFTER ELIMINATIONS = 75

TOTAL NUMBER OF CASES ELIMINATED BECAUSE OF ERROR IN RESPONSE CARD = 0

NUMBER OF CASES WITHOUT OMITTED RESPONSES = 74

NUMBER OF CASES WITH OMITTED RESPONSES = 1

TOTAL NUMBER OF OMITS FOR ALL CASES = 1

TOTAL NUMBER OF UNDEFINED CRITERIA = 0

ROSTER OF RESPONSE PROPORTIONS FOR ITEM ALTERNATIVES
(SAMPLE NO. 21)

ITEM NUMBER	PROPORTION OMITTING RESPONSE	PROPORTION NON-OMIT RESPONSE	PROPORTION RESPONDING ALTERNATE 1	PROPORTION RESPONDING ALTERNATE 2	PROPORTION RESPONDING ALTERNATE 3	PROPORTION RESPONDING ALTERNATE 4	PROPORTION RESPONDING ALTERNATE 5	PROPORTION RESPONDING ALTERNATE 6
1	.0000	1.0000	.0800	.6533	.2400	.0267		
2	.0000	1.0000	.2800	.6533	.0667	.0000		
3	.0000	1.0000	.0800	.5867	.3333	.0000		
4	.0000	1.0000	.0533	.3733	.4800	.0933		
5	.0000	1.0000	.2267	.3867	.3733	.0133		
6	.0000	1.0000	.1867	.4933	.2933	.0267		
7	.0000	1.0000	.0533	.2267	.3733	.3467		
8	.0000	1.0000	.0667	.4800	.4133	.0400		
9	.0000	1.0000	.0400	.3467	.5067	.1067		
10	.0000	1.0000	.1200	.2800	.4267	.1733		
11	.0000	1.0000	.0133	.0667	.3200	.6000		
12	.0000	1.0000	.0667	.4400	.4267	.0667		
13	.0133	.9867	.0533	.4133	.4000	.1200		
14	.0000	1.0000	.3067	.5733	.1067	.0133		
15	.0000	1.0000	.0400	.1600	.5067	.2933		
16	.0000	1.0000	.0400	.4000	.4800	.0800		
17	.0000	1.0000	.0133	.1733	.7467	.0667		
18	.0000	1.0000	.1733	.6667	.1467	.0133		
19	.0000	1.0000	.2400	.6933	.0667	.0000		
20	.0000	1.0000	.0667	.3333	.4933	.1067		
21	.0000	1.0000	.1067	.5467	.3067	.0400		
22	.0000	1.0000	.0533	.4533	.4000	.0933		
23	.0000	1.0000	.1333	.7067	.1467	.0133		
24	.0000	1.0000	.1333	.4800	.3467	.0400		
25	.0000	1.0000	.0533	.3467	.5067	.0933		
26	.0000	1.0000	.0133	.1733	.6533	.1600		
27	.0000	1.0000	.0400	.6000	.3333	.0267		
28	.0000	1.0000	.0400	.6533	.2800	.0267		
29	.0000	1.0000	.1867	.6267	.1867	.0000		
30	.0000	1.0000	.1600	.6133	.2133	.0133		

HOSTEM OF CASE UNIT INFORMATION - SAMPLE 2

CASE ID.	NUMBER ITEMS OMITTED	ID NUMBERS OF ITEMS OMITTED - - -
114	1	13

ITEM SUMMARY INFORMATION ROSTER
(SAMPLE NO. 2)

CASES	COUNTS ITEMS	COUNTS OMITS	CRITERIA
75	30	1	1

OMITS	AMB	VALID	ID
			1

CRITERION INFORMATION

MEAN	ST. DEV.	CASES
535.0267	102.8000	75.

LIST OF EFFECTIVE ITEM NUMBERS AFTER ALL ELIMINATIONS

ITEM NUMBERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
ALTERNATIVES	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

ITEM NUMBERS	23	24	25	26	27	28	29	30
ALTERNATIVES	5	5	5	5	5	5	5	5

CRITERION NUMBER 1
(SAMPLE NO. 2)

ITEM - ALTERNATIVE	MEAN	STD. DEV.	VALIDITY	BIS. VAL.	SIGNIFICANCE .01	SIGNIFICANCE .05	INTERCORRELATIONS ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
1 - 1	.0800	.271	-.1808	-.3300	0	0	1.000	-.405	-.166	-.049	.000	
1 - 2	.6533	.476	-.1535	-.1979	0	0	-.405	1.000	-.771	-.227	.000	
1 - 3	.2400	.427	.2252	.3093	0	0	-.166	-.771	1.000	-.093	.000	
1 - 4	.0267	.161	.1610	.4207	0	0	-.049	-.227	-.093	1.000	.000	
1 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
2 - 1	.2800	.449	.1281	.1708	0	0	1.000	-.856	-.167	.000	.000	
2 - 2	.6533	.476	-.0729	-.0939	0	0	-.856	1.000	-.367	.000	.000	
2 - 3	.0667	.249	-.0916	-.1768	0	0	-.167	-.367	1.000	.000	.000	
2 - 4	.0000	.000	.0000	.0000	0	0	.000	.000	.000	1.000	.000	
2 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
3 - 1	.0800	.271	.1056	.1927	0	0	1.000	-.351	-.209	.000	.000	
3 - 2	.5867	.492	-.1989	-.2515	0	0	-.351	1.000	-.842	.000	.000	
3 - 3	.3333	.471	.1470	.1906	0	0	-.209	-.842	1.000	.000	.000	
3 - 4	.0000	.000	.0000	.0000	0	0	.000	.000	.000	1.000	.000	
3 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
4 - 1	.0533	.225	-.0260	-.0539	0	0	1.000	-.183	-.228	-.076	.000	
4 - 2	.3733	.484	-.0597	-.0763	0	0	-.183	1.000	-.742	-.298	.000	
4 - 3	.4800	.500	.1033	.1296	0	0	-.228	-.742	1.000	-.308	.000	
4 - 4	.0933	.291	-.0580	-.1012	0	0	-.076	-.298	-.308	1.000	.000	
4 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
5 - 1	.2267	.419	.1842	.2560	0	0	1.000	-.430	-.418	-.063	.000	
5 - 2	.3867	.487	-.1376	-.1751	0	0	-.430	1.000	-.613	-.092	.000	
5 - 3	.3733	.484	-.0056	-.0071	0	0	-.418	-.613	1.000	-.090	.000	
5 - 4	.0133	.115	-.0695	-.2164	0	0	-.063	-.092	-.090	1.000	.000	
5 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
6 - 1	.1867	.390	-.0930	-.1350	0	0	1.000	-.473	-.309	-.079	.000	
6 - 2	.4933	.500	-.0303	-.0380	0	0	-.473	1.000	-.636	-.163	.000	
6 - 3	.2933	.455	.0639	.0896	0	0	-.309	-.636	1.000	-.107	.000	
6 - 4	.0267	.161	.1384	.3618	0	0	-.079	-.163	-.107	1.000	.000	
6 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
7 - 1	.0533	.225	-.0369	-.0754	0	0	1.000	-.129	-.183	-.173	.000	
7 - 2	.2267	.419	.0801	.1113	0	0	-.129	1.000	-.418	-.394	.000	
7 - 3	.3733	.484	.1610	.2056	0	0	-.183	-.418	1.000	-.562	.000	
7 - 4	.3467	.476	-.2169	-.2796	0	0	-.173	-.394	-.562	1.000	.000	
7 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
8 - 1	.0667	.249	-.1321	-.2550	0	0	1.000	-.257	-.229	-.055	.000	
8 - 2	.4800	.500	-.1155	-.1498	0	0	-.257	1.000	-.806	-.196	.000	
8 - 3	.4133	.492	.1402	.1772	0	0	-.229	-.806	1.000	-.171	.000	
8 - 4	.0400	.196	.1105	.2514	0	0	-.055	-.196	-.171	1.000	.000	
8 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	

ITEM - ALTERNATIVE	MEAN	STD. DEV.	VALIDITY	BIS. VAL.	SIGNIFICANCE .01	SIGNIFICANCE .05	INTERCORRELATIONS ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
9 - 1	.0400	.196	-.2661	-.6056	0	-1	1.000	-.149	-.207	-.071	.000	
9 - 2	.3467	.476	.0619	.0792	0	0	-.149	1.000	-.738	-.252	.000	
9 - 3	.5067	.500	.0566	.0709	0	0	-.207	-.738	1.000	-.350	.000	
9 - 4	.1067	.309	-.0173	-.0291	0	0	-.071	-.252	-.350	1.000	.000	
9 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
10 - 1	.1200	.325	-.3150	-.5118	-1	-1	1.000	-.230	-.319	-.169	.000	
10 - 2	.2800	.449	.0400	.0533	0	0	-.230	1.000	-.538	-.286	.000	
10 - 3	.4267	.495	-.0060	-.0076	0	0	-.319	-.538	1.000	-.395	.000	
10 - 4	.1733	.379	.2308	.3410	0	1	-.169	-.286	-.395	1.000	.000	
10 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
11 - 1	.0133	.115	-.0905	-.3037	0	0	1.000	-.031	-.080	-.142	.000	
11 - 2	.0667	.249	.0420	.0812	0	0	-.031	1.000	-.183	-.327	.000	
11 - 3	.3200	.466	-.0903	-.1177	0	0	-.080	-.183	1.000	-.840	.000	
11 - 4	.6000	.490	.0857	.1087	0	0	-.142	-.327	-.840	1.000	.000	
11 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
12 - 1	.0667	.249	-.1399	-.2701	0	0	1.000	-.237	-.231	-.071	.000	
12 - 2	.4400	.496	.1633	.2056	0	0	-.237	1.000	-.765	-.237	.000	
12 - 3	.4267	.495	-.0952	-.1200	0	0	-.231	-.765	1.000	-.231	.000	
12 - 4	.0667	.249	.0036	.0069	0	0	-.071	-.237	-.231	1.000	.000	
12 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
13 - 1	.0533	.226	.1240	.2569	0	0	1.000	-.199	-.199	-.088	-.028	
13 - 2	.4133	.492	.0783	.0990	0	0	-.199	1.000	-.685	-.310	-.098	
13 - 3	.4000	.490	-.1625	-.2060	0	0	-.199	-.685	1.000	-.302	-.095	
13 - 4	.1200	.325	.0430	.0699	0	0	-.088	-.310	-.302	1.000	-.093	
13 - 5	.0133	.115	-.0068	-.0229	0	0	-.028	-.098	-.095	-.093	1.000	
14 - 1	.3067	.461	-.0296	-.0329	0	0	1.000	-.771	-.230	-.077	.000	
14 - 2	.5733	.495	-.0326	-.0411	0	0	-.771	1.000	-.901	-.135	.000	
14 - 3	.1067	.309	.0276	.0469	0	0	-.230	-.901	1.000	-.090	.000	
14 - 4	.0133	.115	.1451	.5539	0	0	-.077	-.135	-.090	1.000	.000	
14 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
15 - 1	.0400	.196	-.1900	-.4329	0	0	1.000	-.089	-.207	-.132	.000	
15 - 2	.1600	.367	.0229	.0345	0	0	-.089	1.000	-.992	-.281	.000	
15 - 3	.5067	.500	-.0101	-.0127	0	0	-.207	-.992	1.000	-.653	.000	
15 - 4	.2933	.455	.0795	.0985	0	0	-.132	-.281	-.653	1.000	.000	
15 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
16 - 1	.0400	.196	.1542	.3508	0	0	1.000	-.167	-.196	-.060	.000	
16 - 2	.4000	.490	.0469	.0588	0	0	-.167	1.000	-.789	-.241	.000	
16 - 3	.4800	.500	-.1459	-.1823	0	0	-.196	-.789	1.000	-.283	.000	
16 - 4	.0800	.271	.0726	.1325	0	0	-.060	-.241	-.283	1.000	.000	
16 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
17 - 1	.0133	.115	-.0905	-.3037	0	0	1.000	-.053	-.200	-.031	.000	
17 - 2	.1733	.379	.1630	.2408	0	0	-.053	1.000	-.786	-.122	.000	
17 - 3	.7467	.435	-.0693	-.0992	0	0	-.200	-.786	1.000	-.459	.000	
17 - 4	.0667	.249	-.0898	-.1637	0	0	-.031	-.122	-.459	1.000	.000	
17 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	

SMALL DATA SAMPLE FOR IIOB TEST

ITEM - ALTERNATIVE	MEAN	STD. DEV.	VALIDITY	BIS. VAL.	SIGNIFICANCE .01	SIGNIFICANCE .05	INTERCORRELATIONS ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
18 - 1	.1733	.379	-.0906	-.1338	0	0	1.000	-.648	-.190	-.053	.000	
18 - 2	.6667	.471	-.0122	-.0158	0	0	-.648	1.000	-.586	-.169	.000	
18 - 3	.1467	.354	.1396	.2150	0	0	-.190	-.586	1.000	-.048	.000	
18 - 4	.0133	.115	-.0819	-.2733	0	0	-.053	-.169	-.048	1.000	.000	
18 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
19 - 1	.2400	.427	.0191	.0194	0	0	1.000	-.845	-.150	.000	.000	
19 - 2	.6933	.461	-.0218	-.0286	0	0	-.845	1.000	-.402	.000	.000	
19 - 3	.0667	.249	.0160	.0310	0	0	-.150	-.402	1.000	.000	.000	
19 - 4	.0000	.000	.0000	.0000	0	0	.000	.000	.000	1.000	.000	
19 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
20 - 1	.0667	.249	-.1990	-.3744	0	0	1.000	-.189	-.264	-.092	.000	
20 - 2	.3333	.471	-.0912	-.0534	0	0	-.189	1.000	-.698	-.244	.000	
20 - 3	.4933	.500	.1764	.2211	0	0	-.264	-.698	1.000	-.341	.000	
20 - 4	.1067	.309	-.0661	-.1109	0	0	-.092	-.244	-.341	1.000	.000	
20 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
21 - 1	.1067	.309	-.0913	-.1532	0	0	1.000	-.379	-.230	-.071	.000	
21 - 2	.5467	.498	-.0756	-.0950	0	0	-.379	1.000	-.730	-.224	.000	
21 - 3	.3067	.461	.0983	.1290	0	0	-.230	-.730	1.000	-.136	.000	
21 - 4	.0400	.196	.1045	.2379	0	0	-.071	-.224	-.136	1.000	.000	
21 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
22 - 1	.0533	.225	-.1605	-.3324	0	0	1.000	-.216	-.199	-.076	.000	
22 - 2	.4533	.498	-.1172	-.1473	0	0	-.216	1.000	-.749	-.292	.000	
22 - 3	.4000	.490	.0289	.0367	0	0	-.199	-.749	1.000	-.262	.000	
22 - 4	.0933	.291	.2759	.4812	0	1	-.076	-.292	-.262	1.000	.000	
22 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
23 - 1	.1333	.340	.2117	.3342	0	0	1.000	-.609	-.163	-.046	.000	
23 - 2	.7067	.455	.0110	.0145	0	0	-.609	1.000	-.693	-.180	.000	
23 - 3	.1467	.354	-.1882	-.2899	0	0	-.163	-.693	1.000	-.048	.000	
23 - 4	.0133	.115	-.0905	-.3037	0	0	-.046	-.180	-.048	1.000	.000	
23 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
24 - 1	.1333	.340	-.0623	-.0984	0	0	1.000	-.377	-.286	-.080	.000	
24 - 2	.4800	.500	-.1054	-.1321	0	0	-.377	1.000	-.700	-.196	.000	
24 - 3	.3467	.476	.0919	.1185	0	0	-.286	-.700	1.000	-.149	.000	
24 - 4	.0400	.196	.1535	.3493	0	0	-.080	-.196	-.149	1.000	.000	
24 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
25 - 1	.0533	.225	.0334	.0692	0	0	1.000	-.173	-.241	-.076	.000	
25 - 2	.3467	.476	.1992	.1923	0	0	-.173	1.000	-.738	-.239	.000	
25 - 3	.5067	.500	-.2786	-.3992	0	-1	-.241	-.738	1.000	-.325	.000	
25 - 4	.0933	.291	.2090	.3696	0	0	-.076	-.239	-.325	1.000	.000	
25 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
26 - 1	.0133	.115	-.2556	-.8576	0	-1	1.000	-.053	-.160	-.051	.000	
26 - 2	.1733	.379	-.2006	-.2963	0	0	-.053	1.000	-.629	-.200	.000	
26 - 3	.6533	.476	.0911	.0529	0	0	-.160	-.629	1.000	-.599	.000	
26 - 4	.1600	.367	.2337	.3522	0	1	-.051	-.200	-.599	1.000	.000	
26 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	

ITEM - ALTERNATIVE	MEAN	STD. DEV.	VALIDITY	BIS. VAL.	SIGNIFICANCE .01	SIGNIFICANCE .05	INTERCORRELATIONS ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
27 - 1	.0400	.196	-.3197	-.7276	-1	-1	1.000	-.250	-.199	-.039	.000	
27 - 2	.6000	.490	-.0681	-.0863		0	-.250	1.000	-.866	-.203	.000	
27 - 3	.3333	.471	.2232	.2894	-	0	-.199	-.866	1.000	-.117	.000	
27 - 4	.0267	.161	-.0572	-.1495	0	0	-.039	-.203	-.117	1.000	.000	
27 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
28 - 1	.0400	.196	-.0570	-.1296	0	0	1.000	-.280	-.127	-.039	.000	
28 - 2	.6533	.476	-.0101	-.0233	0	0	-.280	1.000	-.856	-.227	.000	
28 - 3	.2800	.449	-.0299	-.0399	0	0	-.127	-.856	1.000	-.103	.000	
28 - 4	.0267	.161	.2061	.5386	0	0	-.039	-.227	-.103	1.000	.000	
28 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
29 - 1	.1867	.390	.1683	.2993	0	0	1.000	-.621	-.230	.000	.000	
29 - 2	.6267	.484	.0611	.0780	0	0	-.621	1.000	-.621	.000	.000	
29 - 3	.1867	.390	-.2991	-.3543	0	-1	-.230	-.621	1.000	.000	.000	
29 - 4	.0000	.000	.0000	.0000	0	0	.000	.000	.000	1.000	.000	
29 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	
30 - 1	.1600	.367	.3519	.5302	1	1	1.000	-.550	-.227	-.051	.000	
30 - 2	.6133	.487	-.1125	-.1431	0	0	-.550	1.000	-.656	-.196	.000	
30 - 3	.2133	.410	-.1559	-.2195	0	0	-.227	-.656	1.000	-.061	.000	
30 - 4	.0133	.115	-.0905	-.3037	0	0	-.051	-.196	-.061	1.000	.000	
30 - 5	.0000	.000	.0000	.0000	0	0	.000	.000	.000	.000	1.000	

HOSTEM OF SIGNIFICANCE KEYS AND VALIDITIES
(SAMPLE NO. 2)
CRITERION NUMBER 1
(ASTERISKS INDICATE NONEXISTENT ALTERNATIVES)

COUNT	ITEM	.01 SIGNIFICANCE LEVEL KEYS					VALIDITY
1-	1	0	0	0	0	0***	.00000
2-	2	0	0	0	0	0***	.00000
3-	3	0	0	0	0	0***	.00000
4-	4	0	0	0	0	0***	.00000
5-	5	0	0	0	0	0***	.00000
6-	6	0	0	0	0	0***	.00000
7-	7	0	0	0	0	0***	.00000
8-	8	0	0	0	0	0***	.00000
9-	9	0	0	0	0	0***	.00000
10-	10	-1	0	0	0	0***	.31501
11-	10A	-1	1	1	1	1***	.31501
12-	11	0	0	0	0	0***	.00000
13-	12	0	0	0	0	0***	.00000
14-	13	0	0	0	0	0***	.00000
15-	14	0	0	0	0	0***	.00000
16-	15	0	0	0	0	0***	.00000
17-	16	0	0	0	0	0***	.00000
18-	17	0	0	0	0	0***	.00000
19-	18	0	0	0	0	0***	.00000
20-	19	0	0	0	0	0***	.00000
21-	20	0	0	0	0	0***	.00000
22-	21	0	0	0	0	0***	.00000
23-	22	0	0	0	0	0***	.00000
24-	23	0	0	0	0	0***	.00000
25-	24	0	0	0	0	0***	.00000
26-	25	0	0	0	0	0***	.00000
27-	26	0	0	0	0	0***	.00000
28-	27	-1	0	0	0	0***	.31974
29-	27A	-1	1	1	1	1***	.31974
30-	28	0	0	0	0	0***	.00000
31-	29	0	0	0	0	0***	.00000
32-	30	1	0	0	0	0***	.35191
33-	30A	1	-1	-1	-1	-1***	.35191

3 ITEMS HAD NON-ZERO KEYS -

3 ITEMS HAD DUMMY KEYS -

COUNT	ITEM	.05 SIGNIFICANCE LEVEL KEYS					VALIDITY
1-	1	0	0	0	0	0***	.00000
2-	2	0	0	0	0	0***	.00000
3-	3	0	0	0	0	0***	.00000
4-	4	0	0	0	0	0***	.00000
5-	5	0	0	0	0	0***	.00000
6-	6	0	0	0	0	0***	.00000
7-	7	0	0	0	0	0***	.00000
8-	8	0	0	0	0	0***	.00000
9-	9	-1	0	0	0	0***	.26613
10-	9A	-1	1	1	1	1***	.26613
11-	10	-1	0	0	1	0***	.35209
12-	11	0	0	0	0	0***	.00000
13-	12	0	0	0	0	0***	.00000
14-	13	0	0	0	0	0***	.00000
15-	14	0	0	0	0	0***	.00000
16-	15	0	0	0	0	0***	.00000
17-	16	0	0	0	0	0***	.00000
18-	17	0	0	0	0	0***	.00000
19-	18	0	0	0	0	0***	.00000
20-	19	0	0	0	0	0***	.00000
21-	20	0	0	0	0	0***	.00000
22-	21	0	0	0	0	0***	.00000
23-	22	0	0	0	1	0***	.27591
24-	22A	-1	-1	-1	1	-1***	.27591
25-	23	0	0	0	0	0***	.00000
26-	24	0	0	0	0	0***	.00000
27-	25	0	0	-1	0	0***	.27863
28-	25A	1	1	-1	1	1***	.27863
29-	26	-1	0	0	1	0***	.29516
30-	27	-1	0	0	0	0***	.31974
31-	27A	-1	1	1	1	1***	.31974
32-	28	0	0	0	0	0***	.00000
33-	29	0	0	-1	0	0***	.24912
34-	29A	1	1	-1	1	1***	.24912
35-	30	1	0	0	0	0***	.35191
36-	30A	1	-1	-1	-1	-1***	.35191

8 ITEMS HAD NON-ZERO KEYS -

6 ITEMS HAD DUMMY KEYS -

ROSTER OF PATTERN KEYS AND VALIDITIES
(SAMPLE NO. 2)
CRITERION NUMBER 1

ITEM	VALIDITY	KEYING PATTERN				
1	.30651	-1	0	1	1	1
1	.30651	-1	0	1	1	0
1	.30651	-1	0	1	1	-1
1	.28999	-1	-1	0	1	1
1	.28999	-1	-1	0	1	0
2	.19693	1	0	-1	-1	-1
2	.19693	1	0	-1	0	-1
2	.19693	1	0	-1	1	-1
2	.19693	1	0	-1	-1	0
2	.19693	1	0	-1	0	0
3	.19891	1	0	1	-1	-1
3	.19891	1	0	1	0	-1
3	.19891	1	0	1	1	-1
3	.19891	1	0	1	-1	0
3	.19891	1	0	1	0	0
4	.10529	0	0	1	-1	-1
4	.10529	0	0	1	-1	0
4	.10529	0	0	1	-1	1
4	.10357	-1	0	1	-1	1
4	.10357	-1	0	1	-1	0
5	.19619	1	-1	0	-1	-1
5	.19619	1	-1	0	-1	0
5	.19619	1	-1	0	-1	1
5	.19163	1	0	0	-1	-1
5	.19163	1	0	0	-1	0
6	.13934	-1	-1	0	1	1
6	.13934	-1	-1	0	1	0
6	.13934	-1	-1	0	1	-1
6	.13843	0	0	0	1	-1
6	.13843	-1	-1	-1	1	0
7	.22843	0	1	1	-1	-1
7	.22843	0	1	1	-1	0
7	.22843	0	1	1	-1	1
7	.22737	0	1	1	0	-1
7	.22737	-1	1	1	-1	0
8	.20312	-1	0	1	1	1
8	.20312	-1	0	1	1	0
8	.20312	-1	0	1	1	-1
8	.19559	-1	-1	0	1	1
8	.19559	-1	-1	0	1	0
9	.26613	0	1	1	1	-1

ITEM	VALIDITY	KEYING PATTERN				
9	.26613	-1	1	1	1	0
9	.26613	-1	0	0	0	1
9	.26613	-1	0	0	0	0
9	.26613	-1	0	0	0	-1
10	.35209	-1	0	0	1	1
10	.35209	-1	0	0	1	0
10	.35209	-1	0	0	1	-1
10	.31501	0	1	1	1	-1
10	.31501	-1	1	1	1	0
11	.12495	-1	1	0	1	1
11	.12495	-1	1	0	1	0
11	.12495	-1	1	0	1	-1
11	.11139	0	1	0	1	-1
11	.11139	-1	1	-1	1	0
12	.19138	-1	1	0	0	1
12	.19138	-1	1	0	0	0
12	.19138	-1	1	0	0	-1
12	.18967	-1	1	0	1	1
12	.18967	-1	1	0	1	0
13	.18648	1	0	-1	0	-1
13	.18622	1	0	-1	0	0
13	.17894	1	0	-1	0	1
13	.16812	1	0	-1	1	0
13	.16806	1	0	-1	1	-1
14	.16507	0	0	0	1	-1
14	.16507	-1	-1	-1	1	0
14	.16507	-1	-1	-1	0	1
14	.16507	-1	-1	-1	0	0
14	.16507	-1	-1	-1	0	-1
15	.19001	0	1	1	1	-1
15	.19001	-1	1	1	1	0
15	.19001	-1	0	0	0	1
15	.19001	-1	0	0	0	0
15	.19001	-1	0	0	0	-1
16	.18000	1	0	-1	0	-1
16	.18000	1	0	-1	0	0
16	.18000	1	0	-1	0	1
16	.17865	1	0	-1	1	-1
16	.17865	1	0	-1	1	0
17	.18850	-1	1	0	-1	1
17	.18850	-1	1	0	-1	0
17	.18850	-1	1	0	-1	-1
17	.17958	-1	1	0	0	1
17	.17958	-1	1	0	0	0
18	.16198	-1	0	1	-1	1

ITEM	VALIDITY	KEYING PATTERN				
18	.16148	-1	0	1	-1	0
18	.16148	-1	0	1	-1	-1
18	.15571	0	0	1	-1	-1
18	.15571	0	0	1	-1	0
19	.02317	0	-1	1	1	1
19	.02317	0	-1	1	0	1
19	.02317	0	-1	1	-1	1
19	.02317	0	-1	1	1	0
19	.02317	0	-1	1	0	0
20	.22218	-1	0	1	0	1
20	.22218	-1	0	1	0	0
20	.22218	-1	0	1	0	-1
20	.20899	-1	0	1	-1	1
20	.20899	-1	0	1	-1	0
21	.15321	-1	-1	0	1	1
21	.15321	-1	-1	0	1	0
21	.15321	-1	-1	0	1	-1
21	.14938	-1	0	1	1	1
21	.14938	-1	0	1	1	0
22	.30543	-1	0	0	1	1
22	.30543	-1	0	0	1	0
22	.30543	-1	0	0	1	-1
22	.27591	0	0	0	1	-1
22	.27591	-1	-1	-1	1	0
23	.27527	1	0	-1	-1	-1
23	.27527	1	0	-1	-1	0
23	.27527	1	0	-1	-1	1
23	.26187	1	0	-1	0	-1
23	.26187	1	0	-1	0	0
24	.18238	-1	-1	0	1	1
24	.18238	-1	-1	0	1	0
24	.18238	-1	-1	0	1	-1
24	.15350	0	0	0	1	-1
24	.15350	-1	-1	-1	1	0
25	.30546	0	0	-1	1	1
25	.30546	0	0	-1	1	0
25	.30546	0	0	-1	1	-1
25	.29183	-1	0	-1	1	1
25	.29183	-1	0	-1	1	0
26	.32461	-1	-1	0	1	1
26	.32461	-1	-1	0	1	0
26	.32461	-1	-1	0	1	-1
26	.31143	-1	0	1	1	1
26	.31143	-1	0	1	1	0
27	.32132	-1	1	1	0	1

ITEM	VALIDITY	KEYING PATTERN				
27	.32132	-1	1	1	0	0
27	.32132	-1	1	1	0	-1
27	.31974	0	1	1	1	-1
27	.31974	-1	1	1	1	0
28	.20605	0	0	0	1	-1
28	.20605	-1	-1	-1	1	0
28	.20605	-1	-1	-1	0	1
28	.20605	-1	-1	-1	0	0
28	.20605	-1	-1	-1	0	-1
29	.26301	1	0	-1	-1	-1
29	.26301	1	0	-1	0	-1
29	.26301	1	0	-1	1	-1
29	.26301	1	0	-1	-1	0
29	.26301	1	0	-1	0	0
30	.35774	1	0	0	-1	-1
30	.35774	1	0	0	-1	0
30	.35774	1	0	0	-1	1
30	.35191	1	0	0	0	-1
30	.35191	1	0	0	0	0

30 ITEMS HAD PATTERN KEYS

0 ITEMS HAD DUMMY KEYS

ROSTER OF LEAST SQUARE WEIGHTS AND VALIDITIES
(SAMPLE NO. 2)
CRITERION NUMBER 1

ITEM	VALIDITY	LEAST SQUARES WEIGHTS ALT.1	ALT.2	ALT.3	ALT.4	ALT.5	ALT.6
1	.31938	472.00000	523.63061	576.22222	635.00000	.00000	
2	.19657	556.14285	529.57143	499.80000	.00000	.00000	
3	.20253	571.83333	517.86363	556.39999	.00000	.00000	
4	.10717	523.75000	527.07143	546.08333	516.42857	.00000	
5	.20488	570.00000	517.20689	534.28571	478.00000	.00000	
6	.17091	515.07143	531.86486	545.22727	621.00000	.00000	
7	.23060	519.25000	550.23529	556.96428	509.42308	.00000	
8	.21559	484.20000	522.66666	552.19354	590.66666	.00000	
9	.26889	401.00000	543.69231	540.76315	529.87500	.00000	
10	.36906	447.33333	541.61904	534.31250	586.84615	.00000	
11	.13995	455.00000	551.20000	521.50000	542.22222	.00000	
12	.19601	481.20000	553.96970	523.68750	536.39999	.00000	
13	.18889	586.75000	544.61290	514.56667	547.00000	529.00000	
14	.16864	531.21738	532.13953	543.25000	681.00000	.00000	
15	.19766	439.33333	540.91666	534.00000	546.90909	.00000	
16	.19986	612.66666	540.86666	519.47222	560.33333	.00000	
17	.19486	455.00000	571.61538	530.87500	502.40000	.00000	
18	.17321	514.69231	534.14000	569.63636	463.00000	.00000	
19	.02318	537.61111	533.53846	541.20000	.00000	.00000	
20	.23649	460.40000	529.03999	553.40540	515.37500	.00000	
21	.16497	507.87500	527.95122	550.21738	587.66666	.00000	
22	.31848	465.50000	521.79411	538.66666	623.42857	.00000	
23	.27778	590.50000	535.75471	488.36364	455.00000	.00000	
24	.19308	518.70000	523.75000	548.00000	612.33333	.00000	
25	.30579	549.50000	556.07692	506.76316	602.00000	.00000	
26	.37972	309.00000	490.00000	538.10204	590.08333	.00000	
27	.36933	374.00000	529.31110	567.48000	499.60000	.00000	
28	.21260	506.33333	533.67346	530.09524	663.00000	.00000	
29	.27000	571.14285	539.87234	482.64286	.00000	.00000	
30	.36899	617.91666	525.84782	509.25000	455.00000	.00000	

30 ITEMS HAD LEAST SQUARES WEIGHTS - 0 OF THESE WERE SIGNIFICANT

ROSTER OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
.01 KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 1, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.00000	.00000	.00000	0	0	0	0	0	
2	.00000	.00000	.00000	0	0	0	0	0	
3	.00000	.00000	.00000	0	0	0	0	0	
4	.00000	.00000	.00000	0	0	0	0	0	
5	.00000	.00000	.00000	0	0	0	0	0	
6	.00000	.00000	.00000	0	0	0	0	0	
7	.00000	.00000	.00000	0	0	0	0	0	
8	.00000	.00000	.00000	0	0	0	0	0	
9	.00000	.00000	.00000	0	0	0	0	0	
10	-.09075	.31501	.40576	-1	0	0	0	0	
11	.00000	.00000	.00000	0	0	0	0	0	
12	.00000	.00000	.00000	0	0	0	0	0	
13	.00000	.00000	.00000	0	0	0	0	0	
14	.00000	.00000	.00000	0	0	0	0	0	
15	.00000	.00000	.00000	0	0	0	0	0	
16	.00000	.00000	.00000	0	0	0	0	0	
17	.00000	.00000	.00000	0	0	0	0	0	
18	.00000	.00000	.00000	0	0	0	0	0	
19	.00000	.00000	.00000	0	0	0	0	0	
20	.00000	.00000	.00000	0	0	0	0	0	
21	.00000	.00000	.00000	0	0	0	0	0	
22	.00000	.00000	.00000	0	0	0	0	0	
23	.00000	.00000	.00000	0	0	0	0	0	
24	.00000	.00000	.00000	0	0	0	0	0	
25	.00000	.00000	.00000	0	0	0	0	0	
26	.00000	.00000	.00000	0	0	0	0	0	
27	.20337	.31974	.11637	-1	0	0	0	0	
28	.00000	.00000	.00000	0	0	0	0	0	
29	.00000	.00000	.00000	0	0	0	0	0	
30	-.06033	.35191	.41224	1	0	0	0	0	

ROSTER OF ITEM KEYS, VALIDITIES AND CROSS VALIDITIES
PATTRN KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 1, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.10226	.30651	.20425	-1	0	1	1	1	
2	.11922	.14643	.02721	1	0	-1	-1	-1	
3	-.07261	.19891	.27151	1	0	1	-1	-1	
4	.11193	.10523	-.00670	0	0	1	-1	-1	
5	-.11712	.19619	.31330	1	-1	0	-1	-1	
6	.07121	.13934	.06813	-1	-1	0	1	1	
7	-.05320	.22843	.28164	0	1	1	-1	-1	
8	.10335	.20312	.09977	-1	0	1	1	1	
9	.22476	.26613	.04137	0	1	1	1	-1	
10	-.07311	.35204	.42515	-1	0	0	1	1	
11	.06551	.12495	.05944	-1	1	0	1	1	
12	.10545	.19138	.08593	-1	1	0	0	1	
13	-.17365	.18648	.36013	1	0	-1	0	-1	
14	-.02865	.16507	.19372	0	0	0	1	-1	
15	.13854	.19001	.05147	0	1	1	1	-1	
16	-.00869	.18000	.18870	1	0	-1	0	-1	
17	.10220	.18850	.08630	-1	1	0	-1	1	
18	.23764	.16148	-.07616	-1	0	1	-1	1	
19	.12798	.02317	-.10482	0	-1	1	1	1	
20	-.01349	.22218	.23568	-1	0	1	0	1	
21	-.08444	.15321	.23765	-1	-1	0	1	1	
22	-.07628	.30543	.38171	-1	0	0	1	1	
23	.11317	.27527	.16210	1	0	-1	-1	-1	
24	.09597	.18238	.08641	-1	-1	0	1	1	
25	.09549	.30546	.20997	0	0	-1	1	1	
26	-.11475	.32461	.43935	-1	-1	0	1	1	
27	.20336	.32132	.11795	-1	1	1	0	1	
28	.00000	.20605	.20605	0	0	0	1	-1	
29	.00934	.26301	.25367	1	0	-1	-1	-1	
30	-.02598	.35774	.38372	1	0	0	-1	-1	

MUSTEN OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
LST SQ KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 1, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	LEAST SQUARES WEIGHTS FOR ALTERNATIVES 1	2	3	4	5
1	.13571	.31938	.18367	472.00000	523.53061	576.22222	635.00000	.00000
2	.11962	.14657	.02694	556.14285	529.57143	499.80000	.00000	.00000
3	-.13357	.20253	.33610	571.83333	517.88363	556.39999	.00000	.00000
4	.11243	.10717	-.00526	523.75000	527.07143	548.08333	516.42857	.00000
5	-.07099	.20488	.27537	570.00000	517.20689	539.26571	476.00000	.00000
6	.09053	.17041	.07988	515.07143	531.86986	545.22727	621.00000	.00000
7	-.04827	.23060	.27887	519.25000	550.23529	556.96428	504.92308	.00000
8	.10688	.21559	.10871	489.20000	522.66666	552.19354	590.66666	.00000
9	.22101	.26889	.04788	401.00000	543.69231	540.76315	529.87500	.00000
10	-.07853	.36406	.44259	447.33333	541.61904	534.31250	586.84615	.00000
11	.00607	.13495	.12887	455.00000	551.20000	521.50000	542.22222	.00000
12	.02370	.19601	.17231	481.20000	553.96970	523.68750	536.39999	.00000
13	-.19215	.18889	.38104	588.75000	544.61290	514.56667	547.00000	529.00000
14	-.04292	.16869	.21106	531.21738	532.13953	543.26000	681.00000	.00000
15	.12722	.19766	.07044	439.33333	540.91666	534.00000	546.90909	.00000
16	.04952	.19986	.15534	612.66666	540.86666	519.97222	560.33333	.00000
17	.08335	.19986	.11151	455.00000	571.61538	530.87500	502.90000	.00000
18	.22806	.17321	-.05485	519.69231	534.14000	569.63636	463.00000	.00000
19	-.25182	.02318	.27499	537.61111	533.53846	541.20000	.00000	.00000
20	-.05735	.23649	.29385	460.90000	529.03999	553.90590	515.37500	.00000
21	-.10394	.16497	.26891	507.87500	527.95122	550.21738	587.66666	.00000
22	-.02621	.31848	.34469	465.50000	521.79411	538.66666	623.42857	.00000
23	.10888	.27778	.16890	590.50000	535.75471	488.36364	455.00000	.00000
24	.09080	.19308	.10228	518.70000	523.75000	548.00000	612.33333	.00000
25	.10036	.30579	.20542	549.50000	556.07692	506.76316	602.00000	.00000
26	.06708	.37972	.31264	309.00000	490.00000	538.10204	590.08333	.00000
27	.30109	.36933	.06824	379.00000	529.31110	567.98000	499.50000	.00000
28	-.13798	.21260	.35058	506.33333	533.67346	530.09524	663.00000	.00000
29	.04096	.27000	.22904	571.14285	539.87234	482.64286	.00000	.00000
30	-.04768	.36899	.41662	617.91666	525.84782	509.25000	455.00000	.00000

ROSTER OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
+OS KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 1, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.00000	.00000	.00000	0	0	0	0	0	
2	.00000	.00000	.00000	0	0	0	0	0	
3	.00000	.00000	.00000	0	0	0	0	0	
4	.00000	.00000	.00000	0	0	0	0	0	
5	.00000	.00000	.00000	0	0	0	0	0	
6	.00000	.00000	.00000	0	0	0	0	0	
7	.00000	.00000	.00000	0	0	0	0	0	
8	.00000	.00000	.00000	0	0	0	0	0	
9	.22976	.26613	.03637	-1	0	0	0	0	
10	-.07311	.35204	.42515	-1	0	0	1	0	
11	.00000	.00000	.00000	0	0	0	0	0	
12	.00000	.00000	.00000	0	0	0	0	0	
13	.00000	.00000	.00000	0	0	0	0	0	
14	.00000	.00000	.00000	0	0	0	0	0	
15	.00000	.00000	.00000	0	0	0	0	0	
16	.00000	.00000	.00000	0	0	0	0	0	
17	.00000	.00000	.00000	0	0	0	0	0	
18	.00000	.00000	.00000	0	0	0	0	0	
19	.00000	.00000	.00000	0	0	0	0	0	
20	.00000	.00000	.00000	0	0	0	0	0	
21	.00000	.00000	.00000	0	0	0	0	0	
22	-.13879	.27591	.41465	0	0	0	1	0	
23	.00000	.00000	.00000	0	0	0	0	0	
24	.00000	.00000	.00000	0	0	0	0	0	
25	.06061	.27863	.21801	0	0	-1	0	0	
26	-.07162	.29516	.36678	-1	0	0	1	0	
27	.20337	.31979	.11637	-1	0	0	0	0	
28	.00000	.00000	.00000	0	0	0	0	0	
29	.09795	.29412	.19667	0	0	-1	0	0	
30	-.06033	.35191	.41224	1	0	0	0	0	

ROSTER OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
•01 KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 3, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.00000	.00000	.00000	0	0	0	0	0	
2	.00000	.00000	.00000	0	0	0	0	0	
3	.00000	.00000	.00000	0	0	0	0	0	
4	.00000	.00000	.00000	0	0	0	0	0	
5	.00000	.00000	.00000	0	0	0	0	0	
6	.00000	.00000	.00000	0	0	0	0	0	
7	.00000	.00000	.00000	0	0	0	0	0	
8	.00000	.00000	.00000	0	0	0	0	0	
9	.00000	.00000	.00000	0	0	0	0	0	
10	.09690	.31501	.21810	-1	0	0	0	0	
11	.00000	.00000	.00000	0	0	0	0	0	
12	.00000	.00000	.00000	0	0	0	0	0	
13	.00000	.00000	.00000	0	0	0	0	0	
14	.00000	.00000	.00000	0	0	0	0	0	
15	.00000	.00000	.00000	0	0	0	0	0	
16	.00000	.00000	.00000	0	0	0	0	0	
17	.00000	.00000	.00000	0	0	0	0	0	
18	.00000	.00000	.00000	0	0	0	0	0	
19	.00000	.00000	.00000	0	0	0	0	0	
20	.00000	.00000	.00000	0	0	0	0	0	
21	.00000	.00000	.00000	0	0	0	0	0	
22	.00000	.00000	.00000	0	0	0	0	0	
23	.00000	.00000	.00000	0	0	0	0	0	
24	.00000	.00000	.00000	0	0	0	0	0	
25	.00000	.00000	.00000	0	0	0	0	0	
26	.00000	.00000	.00000	0	0	0	0	0	
27	.16058	.31974	.15916	-1	0	0	0	0	
28	.00000	.00000	.00000	0	0	0	0	0	
29	.00000	.00000	.00000	0	0	0	0	0	
30	.06792	.35191	.28398	1	0	0	0	0	

MUSTEM OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
PATTRN KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 3, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.05627	.30651	.25024	-1	0	1	1	1	
2	.06869	.14643	.07774	1	0	-1	-1	-1	
3	-.06318	.19891	.26209	1	0	1	-1	-1	
4	-.10643	.10529	.21167	0	0	1	-1	-1	
5	.20813	.19619	-.01194	1	-1	0	-1	-1	
6	.10277	.13934	.03657	-1	-1	0	1	1	
7	-.12686	.22843	.35530	0	1	1	-1	-1	
8	.01510	.20312	.18803	-1	0	1	1	1	
9	-.03079	.26613	.29692	0	1	1	1	-1	
10	.06961	.35204	.28243	-1	0	0	1	1	
11	-.06481	.12495	.18975	-1	1	0	1	1	
12	.02075	.19138	.17064	-1	1	0	0	1	
13	.37206	.18648	-.18558	1	0	-1	0	-1	
14	-.15525	.16607	.32032	0	0	0	1	-1	
15	-.03006	.19001	.22007	0	1	1	1	-1	
16	-.13080	.18000	.31080	1	0	-1	0	-1	
17	-.06822	.18850	.25672	-1	1	0	-1	1	
18	-.09371	.16148	.25519	-1	0	1	-1	1	
19	-.05696	.02317	.08013	0	-1	1	1	1	
20	-.22574	.22218	.44792	-1	0	1	0	1	
21	-.08514	.15321	.23835	-1	-1	0	1	1	
22	.01804	.30543	.28740	-1	0	0	1	1	
23	-.04463	.27527	.31990	1	0	-1	-1	-1	
24	.05870	.18238	.12367	-1	-1	0	1	1	
25	-.00834	.30546	.31380	0	0	-1	1	1	
26	-.00518	.32461	.32979	-1	-1	0	1	1	
27	.15157	.32132	.16975	-1	1	1	0	1	
28	.06996	.20605	.13609	0	0	0	1	-1	
29	-.04906	.26301	.31207	1	0	-1	-1	-1	
30	.06379	.35774	.29395	1	0	0	-1	-1	

MUSTEM OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
LST SQ KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 3, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	LEAST SQUARES WEIGHTS FOR ALTERNATIVES 1	2	3	4	5
1	.06095	.31938	.25843	472.00000	523.53061	576.22222	635.00000	.00000
2	.07103	.14657	.07553	556.14285	529.57143	499.80000	.00000	.00000
3	-.14791	.20263	.35054	571.83333	517.86363	556.39999	.00000	.00000
4	-.07090	.10717	.17757	523.75000	527.07143	546.08333	516.42857	.00000
5	.22959	.20988	-.01971	570.00000	517.20689	539.28571	478.00000	.00000
6	.02950	.17091	.14591	515.07143	531.86486	545.22727	621.00000	.00000
7	-.13236	.23060	.36296	519.25000	550.23529	556.96428	509.42308	.00000
8	.04733	.21559	.16826	489.20000	522.66666	552.19354	590.66666	.00000
9	-.02167	.26889	.29056	501.00000	543.69231	540.76315	529.87500	.00000
10	.04952	.36906	.31953	497.33333	541.61904	534.31250	586.84615	.00000
11	-.08149	.13495	.21643	455.00000	551.20000	521.50000	542.22222	.00000
12	.01598	.19601	.18003	481.20000	553.96970	523.68750	536.39999	.00000
13	.37519	.18889	-.18626	588.75000	549.61290	519.56667	547.00000	529.00000
14	-.16923	.16869	.33287	531.21738	532.13953	543.25000	681.00000	.00000
15	.00955	.19766	.19311	439.33333	540.41666	534.00000	546.90909	.00000
16	-.11998	.19986	.31934	612.66666	540.86666	519.97222	580.33333	.00000
17	-.02305	.19986	.21792	455.00000	571.61538	530.87500	502.90000	.00000
18	-.06698	.17321	.24019	519.69231	534.14000	569.63636	463.00000	.00000
19	-.11175	.02318	.13492	537.61111	533.53846	541.20000	.00000	.00000
20	-.23655	.23649	.47305	460.90000	529.03999	553.90590	515.37500	.00000
21	-.05899	.16497	.22391	507.87500	527.95122	550.21738	587.66666	.00000
22	.11161	.31898	.20687	465.50000	521.79411	538.66666	623.42857	.00000
23	-.09991	.22778	.32268	590.50000	535.75471	488.38369	455.00000	.00000
24	.10208	.19308	.09100	518.70000	523.75000	548.00000	612.33333	.00000
25	-.01103	.30579	.31682	549.50000	556.07692	504.76316	602.00000	.00000
26	.11295	.37972	.26727	309.00000	490.00000	538.10204	590.08333	.00000
27	.16828	.36933	.20105	379.00000	529.31110	567.98000	499.50000	.00000
28	.12019	.21260	.09296	506.33333	533.67396	530.09524	663.00000	.00000
29	-.04090	.27000	.31091	571.14285	539.87239	482.64286	.00000	.00000
30	.10078	.36899	.26816	617.91666	525.84782	509.25000	455.00000	.00000

ROSTER OF ITEM KEYS, VALIDITIES, AND CROSS VALIDITIES
.05 KEYS FROM SAMPLE 2, CRITERION 1
APPLIED TO SAMPLE 3, CRITERION 1

ITEM NUMBER	CROSS VALIDITY	KEY VALIDITY	VALIDITY DIFFERENCE	KEYS FOR ALTERNATIVES 1	2	3	4	5	6
1	.00000	.00000	.00000	0	0	0	0	0	
2	.00000	.00000	.00000	0	0	0	0	0	
3	.00000	.00000	.00000	0	0	0	0	0	
4	.00000	.00000	.00000	0	0	0	0	0	
5	.00000	.00000	.00000	0	0	0	0	0	
6	.00000	.00000	.00000	0	0	0	0	0	
7	.00000	.00000	.00000	0	0	0	0	0	
8	.00000	.00000	.00000	0	0	0	0	0	
9	-.03079	.26613	.29692	-1	0	0	0	0	
10	.06961	.35204	.28243	-1	0	0	1	0	
11	.00000	.00000	.00000	0	0	0	0	0	
12	.00000	.00000	.00000	0	0	0	0	0	
13	.00000	.00000	.00000	0	0	0	0	0	
14	.00000	.00000	.00000	0	0	0	0	0	
15	.00000	.00000	.00000	0	0	0	0	0	
16	.00000	.00000	.00000	0	0	0	0	0	
17	.00000	.00000	.00000	0	0	0	0	0	
18	.00000	.00000	.00000	0	0	0	0	0	
19	.00000	.00000	.00000	0	0	0	0	0	
20	.00000	.00000	.00000	0	0	0	0	0	
21	.00000	.00000	.00000	0	0	0	0	0	
22	.14810	.27591	.12781	0	0	0	1	0	
23	.00000	.00000	.00000	0	0	0	0	0	
24	.00000	.00000	.00000	0	0	0	0	0	
25	.07726	.27863	.20137	0	0	-1	0	0	
26	.12778	.29516	.16736	-1	0	0	1	0	
27	.16058	.31974	.15916	-1	0	0	0	0	
28	.00000	.00000	.00000	0	0	0	0	0	
29	.03530	.29412	.25882	0	0	-1	0	0	
30	.06792	.35191	.28398	1	0	0	0	0	

SMALL DEMONSTRATION SAMPLE RUN ON TAPE 5=7
(3 SUB-SAMPLES, 75 CASES EACH, 30 ITEMS)

THE PROGRAM INTERPRETS THE CONTROL CARD TO BE THE FOLLOWING

.05 SIGNIFICANCE LEVELS ARE TO BE USED

KEY FILE SAMPLE SEQUENCE = 2

RESPONSE FILE SAMPLE SEQUENCE = 1 3

PROGRAM 5 IS TO BE RUN ----------

CRITERION 1 IS TO BE USED IN BUILDING THE KEYED ITEM RESPONSE FILE

PROGRAM 6 IS TO BE RUN ----------

CRITERION 1 IS TO BE USED TO BUILD THE COMPOSITE
STOP BUILDUP AFTER 200 ITEMS HAVE ENTERED

PROGRAM 7 IS TO BE RUN ----------

CRITERION 1 IS TO BE USED IN THE CROSS-VALIDATION OF THE BUILDUP

SMALL DEMONSTRATION SAMPLE RUN ON TAPE 5-7
ROSTER OF ITEM CHANGES/DELETIONS AND KEYED ITEM RESPONSE FILE COUNTS

AINF	KEYING SAMPLE	RESPONSE SAMPLE	CHANGE REASON	IDENTIFICATION OF ITEMS AFFECTED --																		
1	4	1	-ZERO KEY-	1 24	2 28	3	4	5	6	7	8	11	12	13	14	15	16	17	18	19	20	21
1	• • •	22 ITEMS DELETED FROM THIS FILE LEAVING A TOTAL ITEM COUNT OF 14 (LOST = 22 REG. AND 0 DUMMIES)																				
4	2	3	-ZERO KEY-	1 24	2 28	3	4	5	6	7	8	11	12	13	14	15	16	17	18	19	20	21
4	• • •	22 ITEMS DELETED FROM THIS FILE LEAVING A TOTAL ITEM COUNT OF 14 (LOST = 22 REG. AND 0 DUMMIES)																				

MAXIMUM DIRECT ACCESS FILE SIZE = 17

* ITEM SELECTION SEQUENCE HOSTEN *

KEYS DEVELOPED: ON SUBSAMPLE 2 | COMPOSITE BUILDUP: ON SUBSAMPLE 1

THE ITEMS ARE SELECTED SO AS TO MAXIMIZE THE CORRELATION BETWEEN THE COMPOSITE SCORE AND THE CRITERION VARIABLE

*** COMPOSITE PARAMETERS ******* 5 0 SIGNIF. KEYS = CRITERION 1
DUMMY ITEMS PERMITTED = NEGATIVE WEIGHTS PERMITTED

ITERATION NUMBER	ITEM SELECTED	COMPOSITE VALIDITY	COMPOSITE MEAN	COMPOSITE STANDARD DEVIATION	ITEM VALIDITY
1	9	.2298	-.0667	.4999	.2298
2	27	.2680	-.1733	.9939	.2039
3	25	.2386	-.6900	.0298	.0606
4	29	.2279	-.8267	.0226	.0979

200 ITEMS ON POOL EXHAUSTED

MEAN - CRITERION - ST DEV
998.9867 1 109.1997

4 ITERATIONS IN THIS HOSTEN WITH MAXIMUM COMPOSITE CORRELATION ON ITERATION 4
2 ITERATIONS WITH DECREASE IN COMPOSITE CORRELATION. FIRST DECREASE ON ITERATION 3

THERE ARE 29 TOTAL ITEMS IN THE POOL, INCLUDING --
4 REGULAR ITEMS WITH NEGATIVE VALIDITY
9 DUMMY ITEMS WITH POSITIVE VALIDITY
2 DUMMY ITEMS WITH NEGATIVE VALIDITY
LEAVING 9 EFFECTIVE ITEMS IN THE POOL

* ITEM SELECTION SEQUENCE ROSTER *

:KEYS DEVELOPED: :COMPOSITE BUILDUP:
:ON SUBSAMPLE 2:---------:ON SUBSAMPLE 3 :

THE ITEMS ARE SELECTED SO AS TO MAXIMIZE THE CORRELATION BETWEEN THE COMPOSITE SCORE AND THE CRITERION VARIABLE

*** COMPOSITE PARAMETERS ***** 5** SIGNIF. KEYS - CRITERION 1
DUMMY ITEMS PERMITTED - NEGATIVE WEIGHTS PERMITTED

ITERATION NUMBER	ITEM SELECTED	COMPOSITE VALIDITY	COMPOSITE MEAN	COMPOSITE STANDARD DEVIATION	ITEM VALIDITY
1	27	.1606	-.0533	.4247	.1606
2	22	.2124	.0000	.3266	.1981
3	26	.2194	.1733	.5744	.1278
4	29	.2151	.0400	.6917	.0353
5	10	.2089	.1867	.8115	.0696
6	25	.2036	-.2533	1.0210	.0[illegible]
7	30	.2023	-.0667	1.1505	.0679

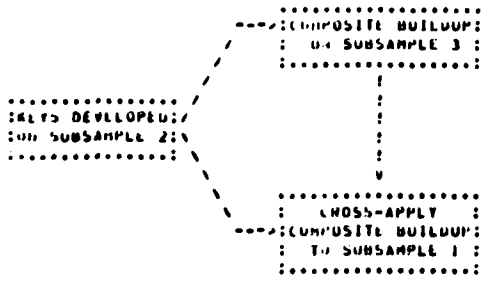
200 ITEMS ON POOL EXHAUSTED

MEAN - CRITERION	-	SI DEV
510.9733	I	113.0351

7 ITERATIONS IN THIS ROSTER WITH MAXIMUM COMPOSITE CORRELATION ON ITERATION 3
4 ITERATIONS WITH DECREASE IN COMPOSITE CORRELATION, FIRST DECREASE ON ITERATION 4

THERE ARE IN TOTAL ITEMS IN THE POOL, INCLUDING --
1 REGULAR ITEMS WITH NEGATIVE VALIDITY
5 DUMMY ITEMS WITH POSITIVE VALIDITY
1 DUMMY ITEMS WITH NEGATIVE VALIDITY
LEAVING / EFFECTIVE ITEMS IN THE POOL

ROSTER OF ITEM SELECTION CROSS VALIDATION
(PRODUCED BY PROGRAM 7)



ITEMS ARE FORCED INTO THE COMPOSITE IN
THE SAME ORDER AS THE BUILD-UP IN IAPG-6

--------- COMPOSITE PARAMETERS ---------

5 & SIGNIF. KEYS
CRITERION 1

DUMMY KEYS ARE ADMITTED
BOTH NEGATIVE AND POSITIVE WEIGHTS ARE ADMITTED

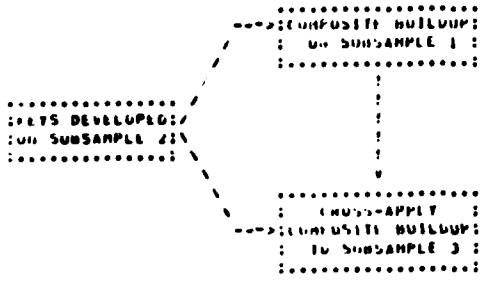
NUMBER OF ITEMS IN THE COMPOSITE	ID NUMBER OF ADDED ITEM	-- SUBSAMPLE 2 (BUILDUP) -- ----- VALIDITY ----- ITEM	COMPOSITE	---------- SUBSAMPLE 1 (CROSS-APPLICATION) ---------- ----- VALIDITY ----- ITEM	COMPOSITE	MEAN OF COMPOSITE	STD DEV OF COMPOSITE
1	27	.1606	.1606	.2039	.2039	-.1067	.3087
2	22	.1981	.2129	-.1387	.1135	-.0800	.3563
3	26	.1278	.2199	-.0716	.0120	.1200	.6101
4	29	.0353	.2151	.0974	.0579	-.0667	.7888
5	10	.0696	.2089	-.0731	.0113	-.0400	1.0265
6	25	.0773	.2034	.0606	.0380	-.6067	1.1000
7	30	.0679	.2023	-.0603	.0129	-.2800	1.2817

NUMBER OF CASES USED IN THIS CROSS VALIDATION = 75

MEAN OF THE CRITERION VALUES = 498.9867

STANDARD DEVIATION OF THE CRITERION VALUES = 109.1997

ROSTER OF ITEM SELECTION CROSS VALIDATION
(PRODUCED BY PROGRAM 7)



ITEMS ARE FORCED INTO THE COMPOSITE IN
THE SAME ORDER AS THE BUILD-UP IN IAPG-6

--------- COMPOSITE PARAMETERS ---------

5 A SIGNIF. KEYS
CRITERION 1

DUMMY KEYS ARE ADMITTED
BOTH NEGATIVE AND POSITIVE WEIGHTS ARE ADMITTED

NUMBER OF ITEMS IN THE COMPOSITE	ID NUMBER OF ADDED ITEM	-- SUBSAMPLE 1 (BUILDUP) -- VALIDITY		---------- SUBSAMPLE 3 (CROSS-APPLICATION) ---------- VALIDITY		MEAN OF COMPOSITE	STD DEV OF COMPOSITE
		ITEM	COMPOSITE	ITEM	COMPOSITE		
1	9	.2298	.2298	-.0308	-.0308	-.0267	.1611
2	27	.2039	.2680	.1606	.1197	-.0800	.2713
3	25	.0806	.2386	.0773	.1262	-.5200	.5509
4	29	.0979	.2279	.0353	.1228	-.6533	.6632

NUMBER OF CASES USED IN THIS CROSS VALIDATION = 75

MEAN OF THE CRITERION VALUES = 510.9733

STANDARD DEVIATION OF THE CRITERION VALUES = 113.035

APPENDIX E; DIAGNOSTIC MESSAGES

I. IAPG 1 to 4 Initialization Program Messages. The following messages will terminate the run:

A. CONTROL CARD MISSING — EXECUTION TERMINATED
The first card read by the initialization program was not the main control card.

B. NOGO SPECIFIED. RUN TERMINATED.
Control cards, including data subsample control cards, are scanned, interpreted, and checked for errors. Data are not processed (in fact data cards must not be present).

II. IAPG 1 Messages

A. The following messages cause run termination:

1. ERROR — CONTROL CARD MISSING
This message occurs when cards of a data subsample control card set are missing.
2. ERROR — ILLEGAL VALUE FOR NUMBER OF RESPONSES FOR ITEM NUMBER XXXX
The maximum response for an item was defined as less than 2 or greater than 5 (with omits valid) or greater than 6 (with omits invalid). The run will terminate after checking the remaining items.
3. TOO MANY CASES ELIMINATED, RUN WILL TERMINATE AT END OF CURRENT SAMPLE
4. STOP. EOF FOUND ON DATA UNIT
End of file (or any systems card) found on data input unit while still expecting to read data.

B. The following messages are warnings of data errors and will not, by themselves, cause data elimination:

1. CRITERION NUMBER X FOR CASE '*α α α α α α α α α α*' IS UNDEFINED.
2. WARNING — CARD NUMBER X OF CASE '*αααααααααα*' HAS THE WRONG CASE ID.
An indicator of out-of-order cards. The case will be eliminated if this is the second such error for the case.
3. ERROR — THE RESPONSE FOR ITEM XXXX IN CASE '*αααααααα α α*' IS X WHICH IS OUTSIDE THE RANGE (XX) FOR THIS ITEM. THE RESPONSE HAS BEEN RECORDED AS AN OMIT OR THE CASE HAS BEEN ELIMINATED (SEE OMIT VALID CODE). IF THE LATTER IS TRUE, A STATEMENT TO THAT EFFECT WILL FOLLOW IMMEDIATELY.

C. The following messages are for errors which will cause a data case to be eliminated from the response data file:

1. ERROR — THE CRITERIA CARD FOR CASE '*αααααααααα*' IS MISSING.
2. ERROR — ALL CRITERIA IN CASE '*α α α α α α α α α α*' ARE UNDEFINED.
   Elimination does not occur immediately; the program will scan the response cards for errors.
3. ERROR — CASE '*αααααα*' HAS MORE THAN ONE CARD WITH THE WRONG ID.
4. ERROR — THE CARD FOLLOWING CARD X IN CASE '*αααααααα α*' IS OUT-OF-ORDER.

D. After each message in IIC above, the following message will appear:
********** CASE '*αααααααααα*' HAS BEEN ELIMINATED **********

E. The following message is for warning purposes only and is connected to message II A3 above:
WARNING — THE NUMBER OF ELIMINATED CASES IN PROGRAM 1 PLUS THE NUMBER OF CASES THAT WILL BE ELIMINATED IN PROGRAM 2, DUE TO INVALID OMITS, WILL EXCEED THE MAXIMUM ALLOWABLE NUMBER OF ELIMINATIONS (XXXXXX) BY XXXXXX.

III. IAPG 2 Messages

A. CASE '*αααααααα*' HAS AN INVALID OMIT ON ITEM XXXXX.
This message appears in the appropriate subsample error roster and the specified case is eliminated.

B. *ERROR IN COMPUTATION OF T.*
Overflow error in computing the t-value associated with a known probability level and degrees of freedom (used in computing significance keys for a continuous criterion). The run terminates.

IV. IAPG 3 Message

ILLEGAL VALUE FOR MAXIMUM ALTERNATIVE

IAPG 4 Messages

The following messages will terminate the run:

A. REQUESTED KEYING OPTION NOT IN ITEM KEY FILE
B. REQUESTED CRITERION NOT IN ITEM KEY FILE

VI. IAPG 5 Messages

A. The following messages will cause run termination:

1. CONTROL CARD MISSING — EXECUTION TERMINATED.
   The first card read by the program was not the IAPG 5 to 7 main control card.
2. ***** WRONG KEYING OPTION *****
   Keying Option 4 (non-existent) was requested on the main control card. Run termination does not occur immediately but will occur when the program is unable to find the key on the item key file.
3. NUMBER OF ITEMS IN KIRF GREATER THAN 500. RUN TERMINATED.

B. The following message is a warning only and occurs when an item, which was requested by the user to be deleted, was already deleted.
ITEM XXX ALREADY DELETED

VII. IAPG 6 Messages

The following messages will cause run termination:

A. REQUESTOR WANTS OPTION X, CRITERION X. FILE READ HAS OPTION X, CRITERION X. Wrong KIRF header read.

B. STOP. ATTEMPTED TO READ PAST END OF KIRF FILE (REEL X) IN PR6.
End-of-file found on KIRF unit before finding requested KIRF. Possible wrong reel mounted, etc.

C. STOP. ATTEMPTED TO READ/WRITE PAST DISK LIMITS IN PR6.
Possibility exists that the direct access file was not defined large enough to contain all of the cases and correlation records. It could be that IAPG 6 is being run separately from IAPG 5 and that MAXREC in the IAPG 5 to 7 main control card was not defined.

VIII. IAPG 7 Messages

A. The following messages will cause run termination:
1. STOP. ATTEMPTED TO READ PAST END OF KIRF FILE (REEL X) IN MAIN 7.
2. WRONG KIRF
   Key or criterion on KIRF is in error.

B. The following messages cause some processing to be skipped:
1. MISSING KIRF XXXX
   The required KIRF had no items; program will skip to next KIRF.
2. MISSING ISSF XXXX
   No items in KIRF, set selection sequence pattern ID to 9 and continue to next KIRF.

IX. IAPG 5 to 7 Table of Contents Message

NO ROSTERS, ONLY ONE KIRF.

X. Program SEARCH message

This is a file searching subroutine used by IAPG 2 to 7. The message will cause run termination.

SEARCH FORTRAN UNIT XX DEVICE ERROR CODE = XXX. RUN TERMINATED.

This indicates that the hardware device for the above FORTRAN unit was not a TAPE drive nor a FASTRAN mass storage device as expected.

APPENDIX F: RUN TIME EXAMPLES

For large problems, an IAPG computer run can be very time consuming. The wall clock times (in hours) for a problem that was run on the UNIVAC 1108 at AFHRL are as follows:

		IAPG 1-4	IAPG 5	IAPG 6-7
53	items, three samples of 500 cases each	1/2	1	1
53	items, three samples of 100 cases each	1/6	1/4	1/4

The times given for IAPG 1 to 4 are for one criterion and all four keying options; however, the times given for IAPG 5 to 7 are for one criterion and only one keying option. No cases or items were eliminated during program execution.